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MACONDO

Q4000 Containment Procedure

for

MC252-1

Start-Up, Flowback, and Shut-Down Procedure

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REFERENCE DOCUMENTS

Reference 1: 4175 220-T2-DO-PR-Subsea Manifold Operations Manual
Reference 2: Subsea Handover from Top Kill Team
Reference 3: Permit to Flare
Reference 4: MC252 Flare Radiation
Reference 5: Velocity Study
Reference 6: Wax Study

1 Start-up, Flowback, and Shutdown

1.1. Introduction and Scope

The team has moved into a containment strategy for hydrocarbons flowing out of the MC252 Macondo well. Recovery from the LMRP Cap will be captured by the Enterprise. The Q4000's role is to extract excess production that the Enterprise cannot take onboard while operating within the parameters of the LMRP Cap system, ultimately reducing hydrocarbons released at the Cap. Recovery from the Horizon BOP choke lines and collection system will be captured, processed, and flared on the Helix Q4000 rig. This procedure details the pre-unloading, kick-off and initial flow, and recovery ramp-up steps. Various shut-down scenarios and associated start-up steps are also included.

The scope of this procedure is:

- To rig up and pressure test the Surface Flow Head Assembly and Schlumberger Well Test equipment.
- To N_2 purge well test equipment to remove air.
- To displace / underbalance LDIS and Coflexip hose to Horizon BOP stack to base oil.
- To start-up surface test equipment on Q4000 and unload the subsea system.
- To ramp-up Q4000 recovery rate, stabilize, and burn all hydrocarbons recovered.
- To minimize oil flow to the sea by complimenting Enterprise recovery rates with Q4000 recovery, all while maintaining LMRP Cap operating parameters.
- To shut down well test operations in planned, weather, and emergency events.
- To restart Q4000 recovery operations after long term and short term shut-downs.
- To flush and purge subsea equipment to the Horizon BOP.
- To flush and purge Q4000 surface equipment to the burner (if possible).

1.2. Assumptions / Well Status

1. The rest of the subsea collection system (LDIS and Coflexip hose) have been connected to the Cameron manifold and tested to 10-kpsi.

Note: The manifold/valves, Coflexip hoses between manifold and subsea BOP stack were pressure tested during top kill and left at 4,000-psi SIP and 14.2-ppg $CaBr_2$.

2. The Schlumberger well test equipment has been pressure tested and functioned tested. The Evergreen burner has been tested.
3. The Enterprise is prepared to pump MEOH for mitigating hydrate formation into the subsea collection system going to the Q4000 at the 2-in MOFFAT on the manifold choke line gooseneck.
4. There are at least 20-bbls of pumpable 11.0-ppg $CaCl_2$ brine available; 200-bbls of MEG (55wt% glycol/45wt% drill water mixture) and 500-bbls of base oil stored in the rig pits.

5. The rig pits and the calcium chloride marine portable tank (MPT) are plumbed to the flow head.
6. Communication protocol has been established with all vessels included in this operation (Attachment 1). Communication is key and it should be noted that the Enterprise may be producing nearly 18-MSTB/D.
7. The flow head has been tested to 80% of working pressure (WP) per SLB procedure and all of its valves have been actuated.
8. The capacity and volumes associated with the work string (from rotary table to subsea BOP stack) are presented in Table 1 below.

Table 1: Capacity and volumes associated with the work string

(from rotary table to subsea BOP stack)

Description	OD (in)	ID (in)	Bbl Capacity (bbls/ft)	Length (ft)	Capacity (bbls)	Cum. Capacity (bbls)
Stick-Up Above RT	6.625	5.581	0.0296	10	0.30	0.30
DP-to Water Level	6.625	5.581	0.0296	53	1.57	1.86
Water level to LDIS	6.625	5.581	0.0296	4810	142.38	144.24
LDIS		5.581	0.0296	51	1.51	145.75
Coflexip to Manifold Goose-neck 1	6.52	3	0.0087	1450	12.68	158.43
Goose-neck 1	6.52	3	0.0087	14	0.12	158.55
Subsea Manifold	6.625	3	0.0087	83	0.73	159.28
Goose-neck 2	6.52	3	0.0087	14	0.12	159.40
Coflexip	6.52	3	0.0087	150	1.31	160.71
BOP Goose-neck	6.52	3	0.0087	21	0.18	160.89

9. Schlumberger's Surface Test Tree Assembly specifications are listed in Table 2 below.(See detail dimensions in Attachment 2).

Table 2: Schlumberger Surface Test Tree Assembly Specifications

Schlumberger's 6&3/8in 15K Surface Test Tree Assembly Specifications	
Size and Working Pressure	6 3/8-in / 15-kpsi
Temperature Rating	0-deg F to 350-deg F
Assembly Weight	32-klbs (47.6-klb W/Basket)
Maximum End Load	1,500-klb (W/0-psi) and 750-klb (W/15-Kpsi).

10. The LDIS ball valve (RIV) and emergency disconnect are controlled through the FMC umbilical on the Q4000.
11. The subsea manifold can be reached using the Q4000's Venom ROV. Any ROV operation will be address in the communication (see Attachment 1) protocol including other vessels in the field.
12. Seawater is in the LDIS.
13. The Q4000 will have an isolated rig pit with at least 200-bbls of usable MEG (55wt% glycol/45wt% drill water mixture) ready and available to pump with the cementing unit, for long term shut-down. In addition, the cementing unit will be hooked up through the rig manifold and chicksan run to the kill side of the surface flow head. This line will be flushed and tested to 80% of working pressure (WP).

Note: Make sure there is no seawater in any pits to avoid any potential for pumping it downhole.

14. Schlumberger spare equipment list has been reviewed and updated and can be found in Attachment 3.

1.3. Objectives

1. Successfully flowback produced fluid from the Macondo well to the Q4000 to complement production processed by the Enterprise and minimize hydrocarbon release at the LMRP Cap.
2. Successfully burn all hydrocarbons produced from the Q4000.
3. Successfully capture BOP acoustic gauge readings with ROVs, in order that the computer system on the Q4000 can accept and process the data and accurately place the data in Process Net.

1.4. HSSE Considerations

1. Verify MSDS sheets for 8.97-ppg MEG (55wt% glycol/45wt% drill water), 11-ppg $CaCl_2$ calcium chloride, 6.6-ppg base oil, including any other fluids on board and all production chemicals are available and discussed during pre job meeting.
2. Rig must call IMP Environmental Section (281-366-6812) or (713-612-4106) to advice of upcoming discharge of fluids. Call should be made to the numbers above by the Well Site Leader 2-hours prior to discharge for information. After contacting Environmental WSL will call Q4000 Superintendent and inform of same upcoming discharge information. A second call should be made 15-minutes prior to the actual discharge.
3. All pressure test should include a 5-min low pressure test to 250-psi; follow by the appropriate high pressure test (the criteria will be either 80% of the equipment working pressure or 3 times the subsea shut-in pressure - approximately 7,500psi) to be considered successful . The high pressure test should be 15-min long.

Note: PRESSURE TESTS SHOULD ALWAYS BE CHARTED AND WHERE POSSIBLE RECORDED AND MONITORED ON DATA ACQUISITION SYSTEM.

Note: NO NITROGEN LEAK TESTS ARE PLANNED.

4. Confirm that fire boats are at station in preparation for flaring/burning operations.
5. Ensure all personnel understand where the high temperature areas are located around the burner. Water curtains will be set up to manage heat from the burner.
6. Ensure only key personnel are in the well test equipment area and that high pressure; high temperature, and noise areas are appropriately marked.
7. Ensure all areas that could cause heat radiation burns have a proper shielding to protect personnel.
8. No crane activity is to take place across the well test equipment during pressure testing or flowback operations, without the respective work permit and JSEA.

Note: Do not lift equipment over pressurized lines without approval from Q4000 Well Site Leader and OIM.

9. Follow proper communications/notification plan prior to flowback (See Attachment 1).
10. Ensure fire fighting equipment and all ESD stations are in appropriate locations around rig according to Attachment 4. Also see hazardous drain locations in Attachment 5.
11. Identify equipment and piping on the facility that are most likely to experience high vibration / loading (Compressors, Transfer pumps, Oil line to flare, 3-in lines, Coflexip hoses) and highlight these areas as part of the pre-start-up checklist (Attachment 6). These areas should be checked at a minimum every tour during operations to allow early identification of any issues.
12. Need to weather vane the rig to optimize wind direction and burners position. Rotation will occur at the Schlumberger flow head swivel, care must be taken to ensure that the Coflexip hose on the bottom of the LDIS is not rotated.

Note: Weather vaning has to be accomplished in maximum 30-degree increments. Perform this operation by marking the drill pipe and rotary. Then move the rig 30-degrees followed by rotating the drill string 30-degrees in the opposite direction using the rig tongs. The swivel in the flow head should turn during this process since the weight in the elevators should retard movement. Repeat this process until the flare is oriented in the desired heading.

13. Daily UT random wall thickness checks.
14. The "Offshore Air Monitoring Plan" can be found in Attachment 7.
15. In case of incident, follow the "Incident Notification Plan" in Attachment 8.
16. The pre-start up check list can be found in Attachment 6.

1.5. Key Risks

1. Inadvertently venting gas while flare is burning resulting in explosion/fire.
2. Dropping pressure to point where water is pulled into the top hat system leading to hydrate formation or disruption of Enterprise flow.
3. Moffat valve arrangement for MEOH injection.
   a. Unable to connect the umbilical.
   b. Unable to independently control MEOH injection for Q4000.
   c. The gooseneck is "flimsy" and care must be taken while pumping/ operating.
4. Riser system and its limitations to "Weather Vane".
5. Potential for subsea or surface plugging during initial flow back due to junk shot debris from top kill operations.
6. Operating temporary equipment as a permanent production system for an extended period of time.

1.6. High Level Procedures & Operating Philosophy for Enterprise & Q4000 Joint Operations

1.6.1. *Purpose*

The purpose of this document is to address the fundamental operating philosophy for containment and disposal of MC-252 effluents. The goal of the joint operation between the Q4000 and Enterprise is to maximize recovery and minimize release of hydrocarbons to sea while protecting the integrity of both systems.

1.6.2. *Description*

Containment of MC-252 effluents is managed through the Enterprise Top Hat system and the Helix Q4000 Incineration Process. The Enterprise can process up to approximately 18,000-STB/d and the Q4000 can process up to approximately 9,000-STB/d. The Enterprise Top Hat system is positioned on top of the Horizon BOP stack. Any excess production not taken by the Enterprise continues to vent to sea until an alternative off take system that is routed to the Q4000 can be installed. Once installed, the Q4000 will take the excess production in order to eliminate or minimize the spill to sea.

The Enterprise system operating philosophy is well documented. The system delivers production through a 6 5/8-in OD (5.4-in ID) drill pipe via heated marine riser to the surface, where the well test facility processes the production stream, flares the gas and stores the oil for future off-loading.

The Q4000 is piped up to the choke and kill lines, and delivers recovery through the choke line connection. Production is then piped through 1,450-feet of flexible hose, and carried to surface via a 6 5/8-in OD (5.581-in ID) drill pipe to surface, where recovery is processed and flared.

The primary objective is to maximize recovery to the Enterprise while minimizing losses to the sea. Since the Top Hat system can potentially entrain water at rates untreatable (beyond approximately 425-bbl/d water), communication between the Enterprise and the Q4000 is essential (**Q4000** Well Site Leader to **Enterprise** Well Site Leader) to ensure that the well is not drawn down to the point where water is "sucked" into the system. The Q4000 role in this operation is to extract excess recovery that the Enterprise cannot take on board while operating within the parameters of the Top Hat system that are established by the Enterprise process team.

The remainder of this document outlines the high level procedures for Initial Start Up, Shut Down, Restart, and Drive Off for both Enterprise and Q4000.

1.6.3. *Initial Start Up of Q4000*

The Enterprise has separate procedures in place for initial start up and is not repeated here. At the time of start up of the Q4000, the Enterprise will have been ramped up to maximum production of approximately 18,000-STB/d. Excess production will be venting to sea via one or more vents on the Top Hat. In order to have stable operations on the Q4000, it is desirable to have a sustained minimum processing flow rate of 2,000-STB/d. After all pressures have been recorded on the surface and subsea, and the **Enterprise** Well Site Leader has been notified and acknowledged its acceptance, the choke line valves (inner and outer gas vent valves, GVV) on the Horizon BOP stack will be opened to a closed choke on the surface test manifold of the Q4000. While the Enterprise monitors their operations as well as the Top Hat operations, the Q4000 will ramp up to 2,000-STB/d. If Enterprise is flowing at capacity and venting to sea is not minimized to an acceptable level, the Q4000 will slowly ramp up, after verifying with the Enterprise it is alright to do so, until the Q4000 is filled out or the vented production is minimized.

At the end of this procedure either both processes are at capacity or Enterprise is at capacity and Q4000 is taking on excess flow (and total well recovery will be known).

1.6.4. *Assumptions*

- Enterprise is processing at or near design maximum of 18,000-STB/d and has stabilized flow.
- There is no water production and at least one vent is open.
- Maximum methanol injection rate is 8-gpm via A and B lines to distribution lines to the Top Hat and the Q4000.
- Q4000 subsea flowline system has been commissioned with approximately 16-bbl of MEG (55wt% glycol/45wt% drill water mixture) in the flex hoses from the LDIS to the hard pipe choke line of the BOP stack and approximately 160-bbl of base oil in the 6 5/8-in drill pipe riser from the surface to the LDIS.
- ROV installed acoustic pressure gauge is installed and operating on the subsea choke line goose neck.
- Both boilers are running and one steam exchanger is on line on the Q4000.

- If the Enterprise flow rate has been choked back, verify that the dispersant injection has been increased to account for the increased spill rate to the sea during transient operations.
- Real time data acquisition for the Enterprise, Q4000, and subsea pressures are being transmitted to the Houston office.
- Horizon BOP and subsea manifold valves will be operated from the Q4000.

1.7. High Level Procedure

1.7.1. *Open Choke and Ramp up Q4000*

1. Log Enterprise rates, BOP pressures, acoustic choke line gauge pressure and trend.
2. Initiate Methanol injection to the Q4000 system (Detail description in section 2.4.1).
3. Record Shut in Tubing Pressure on the Q4000 choke manifold (Should be approximately 550-psi).
4. Open Q4000 adjustable choke and establish flow by taking the base oil back to the 100-bbl P-tanks.
5. Check BS&W and be prepared to take MEG (55wt% glycol/45wt% drill water mixture) to "water" surge tank.
6. Bring flow on at approximately 1,000 to 1,200-STB/d rate and stabilize the separator operating pressures.
7. Bring on the water suppression system and establish efficient flaring operations on the Q4000.
8. Monitor excess plume production, BOP pressures, and Enterprise production rates and pressures. Verify that they are stable.
9. Verify with the Enterprise that it is ready to increase the choke on the Q4000.
10. Slowly increase the adjustable choke (Max 2/64th at a time) or as directed until achieving a 2,000-STB/d rate.
11. Allow flow rate and pressures to stabilize.
12. Repeat Steps 9 through 12 until the Q4000 is at 10,000-STB/d (Design Rate) or until the vent is minimized, which ever comes first.

1.7.2. *Reduce Vented Production to Minimum*

Scenario 1:

If vent is minimized and Enterprise is at capacity, total well production has been achieved. This is unlikely but a possible outcome.

Scenario 2:

If venting is still unacceptable and the Enterprise is at capacity, then Q4000 processing may be increased to reduce spilling production to sea:

1. Monitor excess plume production, BOP pressures, and Enterprise production rates and pressures. Verify that they are stable.
2. Verify with the Enterprise that it is ready to increase the choke on the Q4000.
3. Slowly increase the adjustable choke (Max 2/64th at a time) or as directed in 2,000-STB/d increments.
4. Allow flow rate and pressures to stabilize.
5. Repeat Steps 1 through 4 until the Q4000 is at maximum rate 10,000-STB/d or until the vent is minimized, which ever comes first.

Scenario 3:

If venting is minimized and Enterprise is not at maximum capacity:

1. Decrease Q4000 by 500-STB/d.
2. Increase Enterprise process by 500-STB/d.
3. Repeat 1 and 2 until Enterprise is at capacity.
4. When production is stable, notify the dispersant authority to reduce dispersant to match new vent rates.

1.7.3. *Shutdown and Restart*

There are three scenarios for shut down and restart due to process interrupt.

- Enterprise shuts down and Q4000 continues to operate.
- Q4000 shuts down and Enterprise continues to operate.
- Both processes shut down.

A shutdown is declared long term if it is determined that the down time will exceed 6-hours on either the Enterprise or on the Q4000. Adjustment to dispersant injection rate must be made according to the level of increase in spill rate to control volatile organic compounds (VOC) release around vessels during shutdown.

1.7.4. *Enterprise Shutdown and Restart*

When the Enterprise shuts down, 18,000-STB/d will vent to sea from under the Top Hat tool. The **Q4000** Well Site Leader should be notified immediately and may continue to process at its assigned rate. Plan forward to be agreed among: **Enterprise** Well Site Leader; **Q4000** Well Site Leader; **Well Team Leaders**; **Q4000 and Enterprise** Management. If the shutdown is long term, Q4000 may ramp up if it is not at maximum capacity in order to take on as much of the vented stream as possible to minimize losses to the sea.

Short Term

Once determined that the Enterprise shutdown is short term take the following steps (no actions need to be taken at Q4000):

1. Maintain subsea methanol injection at current established rates.
2. Observe Top Hat. Look for vertical oscillation. If the tool is oscillating, open vents, one at a time until the tool stabilizes.
3. Adjust dispersant injection rate based upon recovery rate.
4. ROV remains on station to manage vents if vent openings have been changed.
5. When interrupt has been cleared, restart Enterprise production by opening choke until either vent is minimized, or maximum capacity of 18,000-STB/d is achieved.
6. As the Enterprise approaches maximum capacity, vent(s) position should have been returned to pre-shutdown position.

Long Term

Once determined that the Enterprise shutdown is long term take the following steps (actions needed to be taken at Q4000):

1. Notify the Q4000.
2. Record current Q4000 rate.
3. If Q4000 is not at capacity ramp up Q4000 at 500-STB/d intervals to maximum capacity or as per instructed by **Q4000** Well Site Leader.
4. When interrupt has been cleared:
   a. Return Q4000 to pre-shutdown rate recorded in step 6 if require.

1.7.5. *Q4000 Shutdown and Restart*

Q4000 shutdown and restart are much simpler to manage. The only consequence of shutting down the Q4000 is that recovery equal to that which the Q4000 was processing will be released to sea until it restarts. The **Enterprise** Well Site Leader should be notified immediately because vents may need to be managed to prevent unstable behavior of the Top Hat and dispersant injection rate needs to be adjusted. Methanol injection distribution may remain in its normal operating state (split between Enterprise and Q4000) provided that the choke line valve remains open. If the choke line valve on the Horizon BOP remains open, the methanol injected in the choke line will eventually displace back into the Horizon BOP and begin treating production directed to the Top Hat. In a "short term" shut down scenario, no manipulations of the subsea valves are required. The well is shut in at the surface flow head on the Q4000 with pressure trapped on the subsea flow line in order to prevent collapse of the flexible hose. In a "long term" shut down scenario, the flow line from the Q4000 back to the Deepwater Horizon BOP stack is flushed with MEG (55wt% glycol/45wt% drill water mixture) and the choke line valves on the BOP stack are closed. The subsea methanol injection will need to be maintained at the established rate (max. approximately 8-gpm) with it no longer being split between the Enterprise and the Q4000.

Short Term

Once determined that the Q4000 shutdown is short term take the following steps:

1. Notify the **Enterprise** Well Site Leader.
2. Isolate flow line from the surface equipment on the Q4000 by shutting in the surface flow head valves prior to bleeding off any pressures.
3. Maintain subsea methanol injection for both the Enterprise and the Q4000 at established rates (maximum approximately 8-gpm combined).
4. Record Q4000 production from log just prior to shutdown this will be the target rate for restart following shutdown.
5. When interrupt has been cleared, increase Q4000 recovery to the rate recorded in step 4, ramping up in 500-STB/d steps until either vent is minimized, or recorded target rate is achieved. As Q4000 returns to its target rate, close vents to maintain steady stream from vent(s) remaining open and adjust dispersant rate.

Long Term

Once determined that the shutdown is long term take the following steps:

1. Notify the Enterprise of status and prepare to pump out all excess hydrocarbons on surface to the flare.
2. Record Q4000 production from log just prior to shut down as this will be the target rate for restart following shut down.
3. Maintain subsea methanol injection for both the Enterprise and the Q4000 at established rates (maximum approximately 8-gpm combined).

4. Adjust dispersant injection rate to match increase in venting rate. The increase will be equal to the rate lost by the Q4000.
5. Displace the Q4000 subsea flow line system from the surface through the Deepwater Horizon BOP stack with MEG (55wt% glycol/45wt% drill water mixture).
6. Discontinue methanol injection to the Q4000, maintain methanol injection to the top hat at established rate (max approximately 8-gpm).
7. Close the choke line valves (inner and outer GVV) on the Horizon BOP stack.
8. When interrupt has been cleared:
   a. Reinitiate methanol injection to the Q4000 (maximum methanol injection rate approximately 8-gpm for Q4000 and Enterprise combined).
   b. Open the choke line valves on the Horizon BOP stack.
   c. Displace the 6 5/8-in riser on the Q4000 with base oil in order to get underbalance for flow.
   d. Perform start up procedure for the Q4000.
   e. Increase Q4000 recovery to the rate recorded in step 2, ramping up in 500-STB/d steps until either vent is minimized, or recorded target rate is achieved. As Q4000 returns to its target rate, close vents to maintain steady stream from vent(s) remaining open and adjust dispersant injection rate accordingly.

1.7.6. *Enterprise and Q4000 Shutdown and Restart (PSD or Drive Off)*

When both the Enterprise and Q4000 shut down, all recovery will vent to sea from under the Top Hat tool. Depending on the Top Hat being used, it may become dynamically unstable and start bouncing on the Horizon BOP stack. First priority must be given to stabilizing the tool if this happens. Stabilization is managed by opening vents on top of the hat. If the shutdown is long term it is likely that the vents will have to be opened to their initial Top Hat installation position (probably all open). Adjustment to dispersant rate must be made to accommodate the new spill rate.

There is no distinction between long term and short term for the instance where both facilities have been shut down, since there is no leverage to be gained from either facility, and either could potentially be started before the other.

There is also little difference between shut down due to simultaneous (or near simultaneous) recovery shut down and shut down due to drive off (such as for hurricane avoidance).

Note: The Q4000 may not restart without the Enterprise on station, Top Hat installed, and methanol injection aligned with the Q4000 flow line. Not having methanol injection into the Q4000 flow line prohibits it from start-up or continuing to flow. Methanol cannot be shut-down to Enterprise or Q4000 during recovery operations.

It is therefore assumed that the Enterprise and Q4000 have been positioned and connected to their respective systems prior to initiating this procedure and that their risers / flow lines have been properly displaced for start up:

1. Record recovery rate at Enterprise prior to shutdown. This is the Enterprise target rate.
2. Record recovery rate at Q4000 prior to shutdown. This is the Q4000 target rate.
3. The Enterprise hold rate is equal to its target rate.
4. Ensure that methanol injection is aligned to the Top Hat and methanol injection is at maximum rate approximately 8-gpm.
5. ROV remains on station to manage vents if vent openings have been changed.
6. Adjust vents as needed based on operating experience from initial startup. Under no circumstances should recovery not be venting. Not venting means water is being entrained and risk of hydrate plugging is high.
7. Start up Enterprise, and ramp up to the Enterprise hold rate, using established procedures for either drive off, or restart depending on the circumstances surrounding the shut down. Manage vent rates during ramp up to maintain reasonable velocities and ensure proper Top Hat seal.
8. Establish methanol injection to the Q4000. Maintain subsea methanol injection for both the Enterprise and the Q4000 at established rates (maximum approximately 8-gpm combined).
9. Start up Q4000, and ramp up to the Q4000 target rate, using established procedures. Manage vent rates during ramp up to maintain reasonable velocities and proper Top Hat seal.
10. Increase Q4000 recovery by opening choke 2/64th per step until either venting is minimized, or the Q4000 target rate is achieved. As the Q4000 returns to capacity, close vents to maintain steady stream from vent(s) remaining open.
11. As the Q4000 approaches maximum capacity, vent(s) position should have been returned to pre-shutdown position.

2 Start-Up

2.1. Rig Up Flow Head and Pressure Test

Note: A meeting to discuss the operations, associated test, and potential hazards should be discussed among the bridge, rig floor, BP supervisor, and Schlumberger test tree supervisor.

Note: After all of the pressure tests have been completed, a 2-in line check valve will be installed and a final pressure test will be performed.

Note: See Figure 2 to reference all pressure test lineup.

1. Rig up Frank's 500t 10 3/4-in side door elevators to the rig's 500t bails.
2. Break out and LD the TIW and PIS from the 6 5/8-in LDIS landing string.
3. PU and MU Schlumberger's Surface Test Tree Assembly to the 6 5/8-in LDIS landing string and space out bottom of test tree assembly 15-ft above rig floor, see Figure 1 below. There are two options, that will be subject to the discretion of the rig site leader ship team based on operational and safety considerations:
   a. *Option 1*: Pick up and make up tree to LDIS landing string and then connect Coflexip hoses (preferred option).
   b. *Option 2*: Connect the Coflexip hoses prior to picking up the SLB Surface Test Tree.

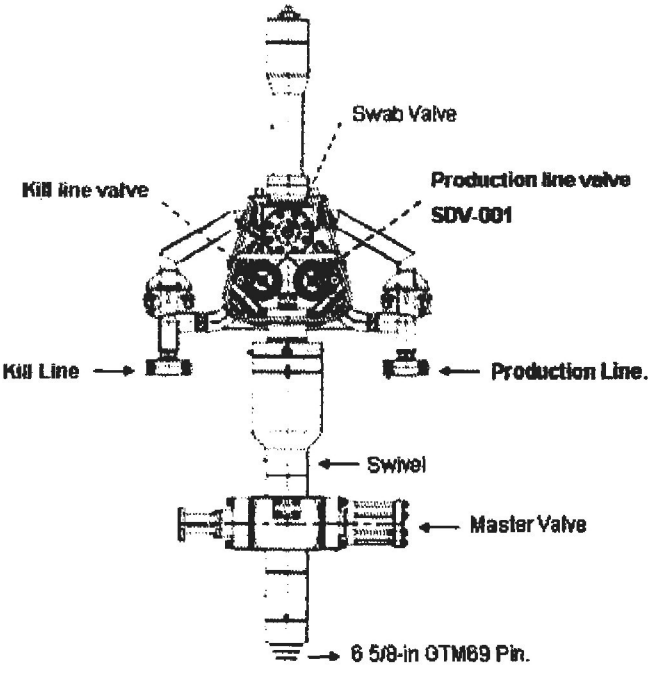

Figure 1

Note: Verify the break over torque for the surface swivel. Experience has shown high break over values and this figure needs to be confirmed prior to operations.

4. MU the 4-in 1502 connection on the 4-in 10k Coflexip hose to the 15K Cameron 6 Hub x 4-in 1502 crossover that has been previously made up to the flow wing of the surface test tree.
5. MU the 4-in Coflexip hose to the 4-in 1502 crossover already made up to SDV 002 safety valve on the sand knockout vessel.
6. MU the 2-in Coflexip from the cement manifold to the 2-in WECO kill side of the Schlumberger test tree.
7. Jump the ROV in position at the LDIS to monitor while performing the 30-degree weather vane test to starboard and port in order to confirm that the Schlumberger swivel is performing by design and that the LDIS landing string does not exceed the 30-degree operating window.

CAUTION:	**Prior to each pressure test make a notification that a pressure test is in progress and have all personnel stay clear of all test areas. Record and Chart each pressure test.** **When operating "Gate Valves," always count and record total amount of turns it takes to close and/or open.**

2.1.2. *Flushing Coflexip*

8. Close the swab valve and open both wing valves and keep the master valve closed.
9. Open all valves including adjustable chokes on surface well test choke manifold.
10. Open through both steam exchangers.
11. Open oil by-pass and close inlet on separator.
12. Open through oil manifold to P-tank.
13. With the cement unit, break circulation through the surface well test package with MEG (55wt% glycol/45wt% drill water mixture) taking returns at the P-tank.
14. Shut down the cement unit when returns are observed at the P-tank.

2.1.3. *Test kill wing*

15. Close the kill wing valve on the Schlumberger surface test tree.
16. Pressure up with cement unit to 250 low for 5-min, 7,500 high for 15-min. After successful pressure test bleed off at cement unit.

2.1.4. *Test Swab, SDV 001, RIV and Landing String*

17. Verify that the subsea RIV valve is closed.
18. Confirm SDV 001 is closed.
19. Open master valve on Schlumberger test tree.
20. Pressure up with cement unit 250-psi low for 5-min, 7,500-psi high for 15-min against the RIV and Schlumberger test tree swab and SDV 001 valves.

2.1.5. *Perform Negative Test Master Valve*

21. After a successful 7,500-psi pressure test, hold pressure and close the Schlumberger test tree master valve in order to trap pressure between the master and RIV valve.
22. Perform a negative test across the Schlumberger test tree master valve by bleeding off at the cement unit to 3,500-psi and record pressure.
23. Record start pressure at the choke manifold data header and performed a 15-min negative test.
24. Use the cement unit to pressure up against the master valve to 7,500-psi.
25. Open master valve and bleed off LDIS landing string.

2.1.6. *Test Coflexip Choke Manifold*

26. Close the down stream gate valves at the surface well testing choke manifold.
27. Pressure up with cement unit to 250-psi low for 5-min, 7,500-psi high for 15-min. After successful pressure test bleed off at cement unit.
28. Close upstream gate valves at the surface well testing manifold. Open downstream gate valves of the surface well testing choke manifold to bleed off pressure.
29. Pressure up with cement unit 250-psi low for 5-min, 7,500-psi high for 15-min. After successful pressure test bleed off at cement unit.

If not completed already, test Coflexip SDV 003

30. Close SDV 003 in front of the surface well testing manifold. Open the up stream gate valves of the surface well testing choke manifold to bleed off.
31. Pressure up with cement unit 250-psi low for 5-min, 7,500-psi high for 15-min.

If not completed already, Test Coflexip SDV 002

32. Close SDV 002 in front of the sand knockout Open up SDV 003 in front of the surface well testing choke manifold to bleed off.
33. Pressure up with cement unit 250-psi low 5-min 7,500-psi high for 15-min. After successful pressure test open master valve and bleed off at cement unit.

2.1.7. *Install in Check Valve Kill Side and Test*

34. Break off 2-in Coflexip for kill side of Schlumberger test tree.
35. Install 2-in in-line check valve.
36. MU 2-in Coflexip to 2-in in-line check valve on Schlumberger test tree kill line.
37. Open SDV 001 on the Schlumberger test tree and verify choke manifold and valves are open to the P-tank.
38. Break circulation and close kill valve.
39. Pressure up with cement unit 250-psi low 5-min, 7,500-psi high for 15-min. After successful pressure test bleed off at cement unit.

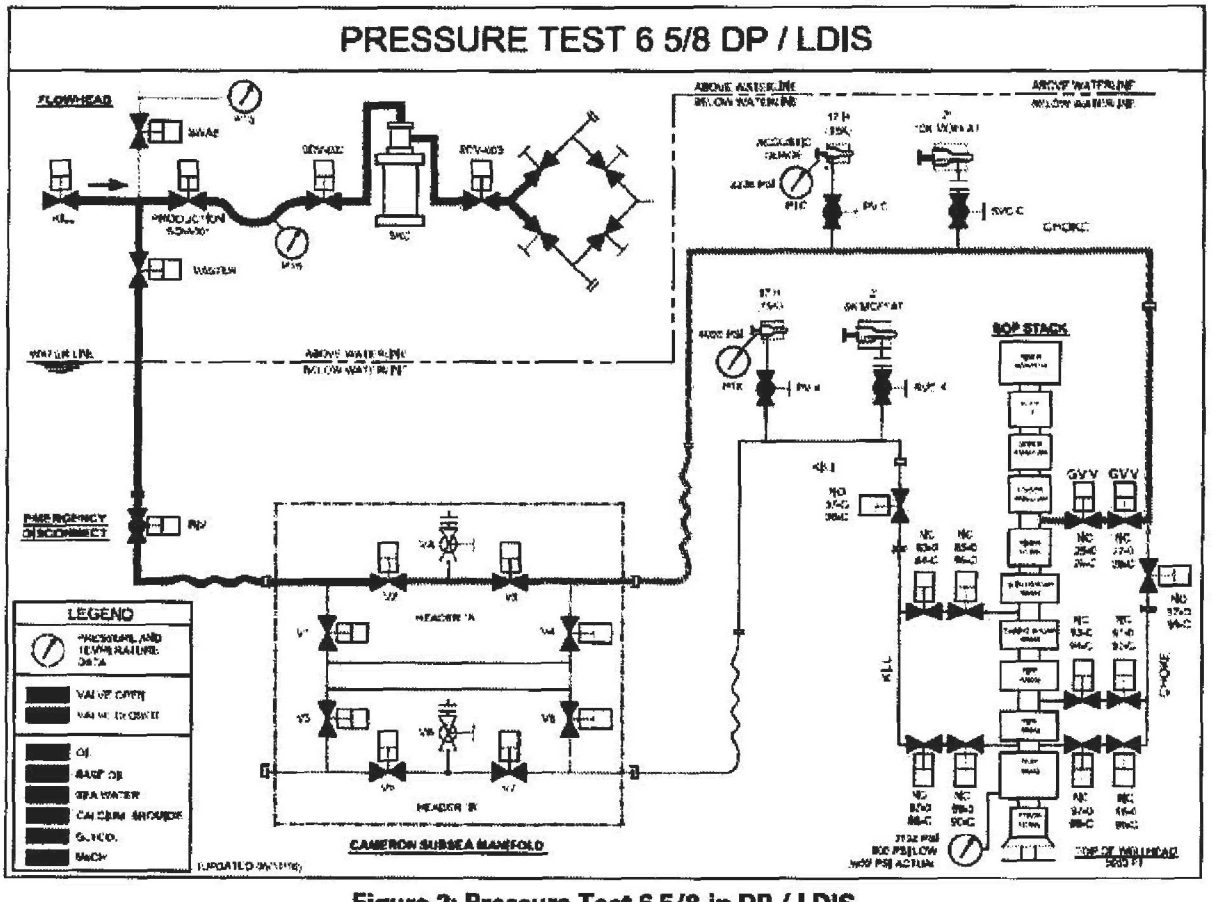

Figure 2: Pressure Test 6 5/8-in DP / LDIS

2.2. Purge Well Test Equipment with Nitrogen to Remove Air

Flush the well test equipment system to remove air and eliminate the possibility of creating an explosive mixture when hydrocarbons are introduced when bringing the well on. The expectation is that there will be liquid levels at the separator and the P-tank to help minimize the amount of nitrogen required for purge. Follow the procedure below step by step.

1. Purge Separator:
   a. Rig up one 24 bottle rack of N_2 to the needle valve to top of the separator gas meter run.
   b. Close the separate inlet and bypass valves and all outlet valves (gas, oil, and water).
   c. Open the nitrogen bottles to the closed in separator and build pressure to 300-psi.
   d. With the pressure control valve closed, open the gas outlet valve. Operate the pressure control valve to open and allow venting to HP vent flare.
   e. Check the oxygen content at the separator's gas line needle valve. As separator pressure drops, if the oxygen content is greater than 6%, repeat steps B-E.
   f. If oxygen levels are less then 6%, the purge of the separator is complete.
   g. Repeat B-C to establish 300-psi on separator to hold for startup operations.
2. Purge Oil and Water Pressurized Tanks:
   a. Rig up two 24 bottle rack of N_2 manifolded together to nitrogen header.
   b. Rig up for injection at each gas run of the pressurized tanks. Run injection hose from header to each tank.
   c. Open the nitrogen valves to charge the nitrogen header.
   d. Open the valves at the header to tank #1 and the valves at this tank to allow nitrogen to purge (displaced volume to this tank is approximately 927-scf of Nitrogen).
   e. Check the oxygen content at the tanks gas line needle valve. If oxygen content is >6%, continue with purge until levels below 6% are achieved.
   f. Repeat the process for tank #2 and #3 starting at 2b. Total Nitrogen volume required for the three tanks is 5,562-scf.
3. Final Preparations:
   a. Realign all valve positions, ensuring that flow is directed through the steam exchangers and into the separator (independently verify all valve positions and discuss any discrepancies).
   b. Check and independently verify that all Car seal Closed Valves are just that, and that all Car Sealed Open Valves as per the P&ID (Attachment 9).
   c. Light the Flare Pilots.

d. Install new charts on chart recorders.

e. Hold Safety Meeting.

f. Check that flare pilots have remained lit and that chart recorders are functioning.

g. Triple-check all valve positions. Have all valve positions independently verified by another crew member. Discuss any discrepancies.

h. Synchronize watches.

i. Verify that good communications exist between the rig, the heliport, and the office and all other vessels in the field.

Note: After startup, if the burning needs to be switched from continuous to batch operations, turn on the Nitrogen to the P-Tanks for 15-minutes prior to shut down.

2.3. Flush 6 5/8-in DP, LDIS, Coflexip Hose to Underbalance Well

2.3.1. *Open RIV*

Note: See to Figure 3 to reference the displacement operation.

1. Keep the swab valve open, there will be a pressure gauge installed on top. Open shut down valve (SDV 001). Isolate the well test system by closing the upstream gate valve on the choke manifold.
2. Open the master valve (if not already done) and kill line.
3. There is 4,000-psi trapped in the subsea manifold. Verify trap pressure in the subsea manifold at the choke line acoustic gauge with ROV. Based on the pressure at the acoustic gauge calculate the difference between the acoustic gauge reading and the hydrostatic column of sea water at the Cameron manifold subsea valve V2 in order to determine the amount of pressure to apply in order to equalize across valve V2 before opening it.

Note: Verify calculations with Well Test Advisor (Mike Ward).

4. The seawater calculated hydrostatic is 2,232-psi at valve V2.
5. Open RIV (see Attachment 10) and pressure up to calculated value from Step 3 in order to equalize pressure at the subsea manifold. Record the volume pumped.

2.3.2. *Open Subsea Manifold Valves*

6. Open V2 and V3 valves on Cameron subsea manifold, per the diagram below. This will open communication from surface to the closed gas vent valves of the choke line on the Horizon BOP Stack.
7. Record static pressure at the acoustic subsea gauge and surface pressure at the Schlumberger closed in choke manifold.

Note: Verify pressures with Well Test Advisor (Mike Ward).

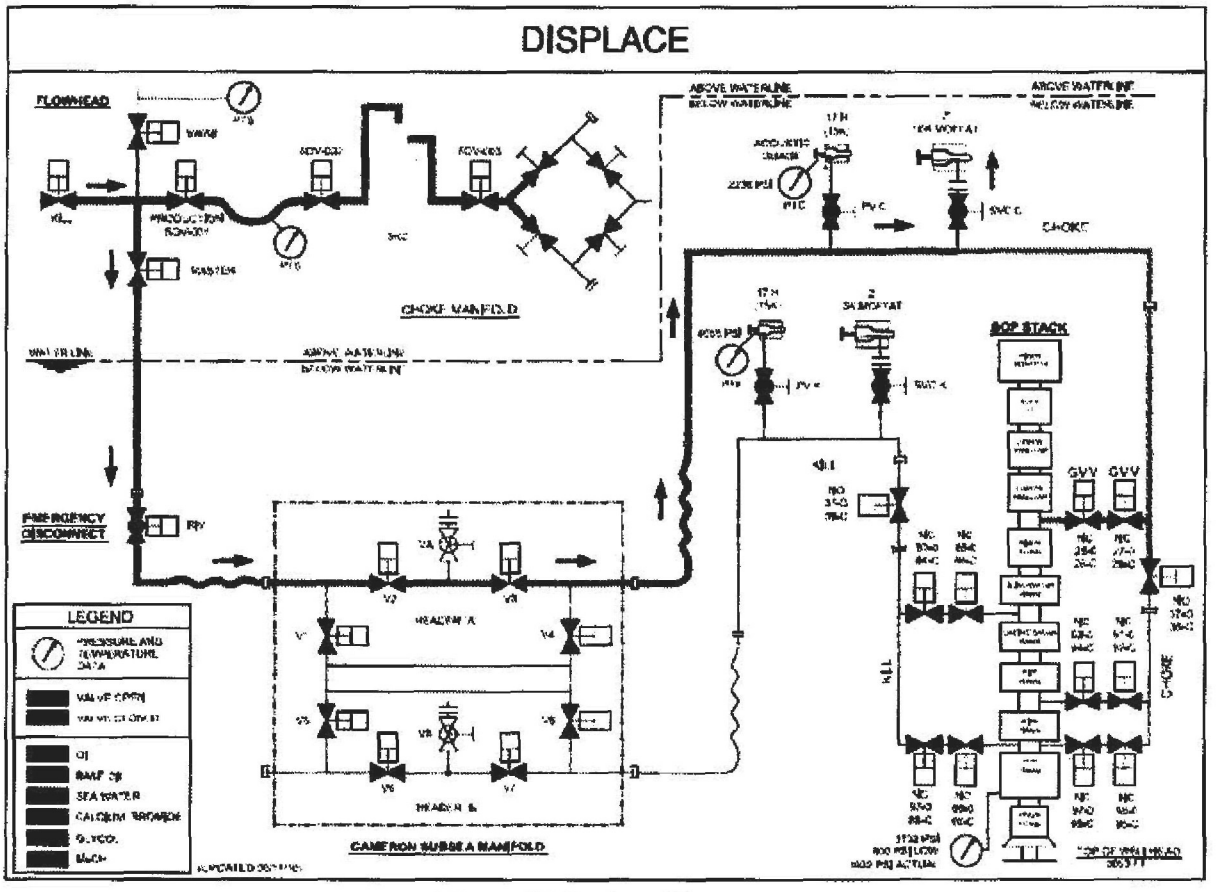

Figure 3: Displace Diagram

2.3.3. *Perform Flush*

8. Bleed off pressure through the surface well test equipment to seawater gradient, compare bleed back volume with volume pumped.

Note: Do not exceed 1.5x the amount of volume pumped while bleeding back to the surface well test equipment. If this volume is reached, shut-in, record pressures and notify Houston office.

9. Have ROV confirm pressure at the acoustic gauge on the choke line gooseneck. Then have ROV open the valve at the 2-in Moffat (see Attachment 11).
10. Flush system by pumping the following fluid at 4-bpm (to avoid eroding Moffat valve):
    a. 20-bbls of 11.0-ppg $CaCl_2$ brine.
    b. 25-bbls of 8.97-ppg MEG (55wt% glycol/45wt% drill water mixture).
    c. 160-bbls of 6.6-ppg base oil, this will spot the base oil within 1 to 2-bbls of the 2-in Moffat.

Note: A 6.6-ppg base oil column to the flow head will create approximately 500-psi U-tube pressure to the seawater head at the Moffat valve.

11. After flushing is finished, have the ROV close the valve at the 2-in Moffat. Close the kill line on the flow head to isolate the cement unit. Close the upstream gate valves of the surface choke manifold. Monitor the 500-psi U-tube pressure against the closed upstream gate valves of the surface choke manifold.
12. Instruct ROV, to connect one of the Enterprise umbilical to the 2-in Moffat so it can pump MEOH into the Q4000 system.

2.4. Initiate Flow to Q4000

2.4.1. *Pre-Flow Check List*

1. Review BP and Schlumberger Pre-Start Up Checklist (Attachment 6) and perform walk through of the equipment.
2. During walk through, verify that the initial flow will be through the sand knockout in case there are solids produced during flow back and that there is a by-pass (flow may be limited as the stream would go from a 3 1/16-in down to 2 1/16-in). Sand knockout is installed in case there is any debris that is flowed back due to the junk shot during top kill operations.
3. Verify that the Separator has been purged with nitrogen, that a water level has been left in it, and that it is pressurized to 150-psi with nitrogen since it will not be bypassed on initial start up.
4. Verify that any exposed pipe or valves in steam service are insulated (or isolated) to prevent personnel from coming into contact and potentially being injured.
5. Ensure that the Defoamer and Demulsifier are hooked up and that the pumps operate properly.
6. Wax deposition is not expected, however, Schlumberger will periodically test the BS&W leg of each well test vessel for wax deposition. In addition, subsea pressure trends will also be monitored for indications of paraffin buildup.
7. The operability of the oil steam exchangers are critical as they provide the necessary heat to eliminate potential low temperature issues with the flare system.
8. Surface methanol injection is available to assist in suppress hydrate formation.
9. Verify that the water curtain is set up and operational and ensure that a low pressure shut-down set at 50-psi is installed on the water curtain booster pumps.
10. Verify that everyone has their proper PPE for chemical and hydrocarbon handling.
11. Verify that the valves on the choke manifold are closed.
12. Verify that the valves on the oil manifold have been properly aligned and placed in the correct position as per P&ID (Attachment 9).
13. Establish a baseline UT survey of wall thickness prior to start up.

14. Verify that the methanol injection line has been connected to the 2-in 6k Moffat valve and pressure tested to 4,000-psi if possible.
15. Obtain the BOP flowing pressure upstream of the closed Gas Vent Valves.
16. Record subsea system pressure off the acoustic gauge downstream of the closed Gas Vent Valves.
17. Hold pre job start up meeting between the Enterprise and the Q4000 to review operating plan and verify the PIC on each operation and what the primary and secondary communication paths are going to be between the two vessels.
18. Verify ROV and Methanol operating plans for the operations.
19. Verify that the thermal control on the heat exchangers are alarmed and being recorded on the data acquisition system in order to give warning of potential hazard.
20. Every 6-hours check fuel levels on compressors, boilers and utilities. Refuel as require.
21. BP Well-site leader to conduct Emergency Shut-down drill and test of the Emergency Shut Down system, utilizing communications plan.

Note: **The plan is to begin pumping methanol into the 2-in Moffat valve of the Q4000 line, open the Gas Vent Valves, and to initiate flow into the Schlumberger Separator. The initial base oil used in the flow line displacement will be sent to the flare boom from the P-tank.**

Note: **Lack of visibility from the oil plume coming out of the Top Hat may not allow the jumper line to be safely pulled from the Top Hat and reconnected to the 2-in Moffat valve. As a result, this will have to be an on-site decision between the Enterprise and the Q4000 and could dynamically change with flow or subsea currents. If and when it is agreed that it is safe to do this operation, it should be performed even if it is after the Q4000 start up. Not having the methanol injection into the Q4000 flow line will not prohibit it from start-up or continuing to flow. Methanol can not be shut-down to Enterprise.**

Methanol Injection System

The methanol distribution system consists of a single 6 line umbilical from the Enterprise that splits subsea with "A" line containing 2 lines and "B" line containing 4 lines. The test rates through the lines are as follows:

- A-Line: 5-gpm at 10,000-psi.
- B-Line: 8-gpm at 9,200-psi.
- A & B Combined: 8-gpm at 6,000-psi.

The only way to control down hole distribution between the Top Hat and the Q4000 line is by dictating which line is connected to a particular entry point and by the "path of least resistance". At this time, it is assumed that the "A" line will be connected to the 2-in Moffat for the Q4000 and the "B" line will remain attached to the Top Hat. There are two methanol pumps on the surface on the Enterprise, with only one being utilized at the present time.

2.4.2. *Follow the Unload Fluid / Begin Clean-Up / Flow Procedure*

1. Notify Enterprise and Position Personnel:
   a. Make final confirmation with the Enterprise that methanol injection was initiated into the Q4000 line.
   b. (1) men on rig floor, (1) man at the Choke Manifold / steam exchanger / Chemical Injection, (1) man at the Steam Boiler, (2) men at the separator / Chemical Injection, (2) at the Surge Tanks and Oil Manifold, (2) at the compressors, pumps and flare booms, (2) for PTVx and data acquisition.
2. Unload Fluid and Begin Clean-Up:
   a. Ensure that the entire Safety System is active.

Note: The PSL's will be by-passed until the setting pressure has been achieved. The PSL's to be manually monitored until this occurs and then reactivated.

   b. Verify that all valves on the surface Choke Manifolds are closed.
   c. Open downstream valve on adjustable choke side of the Choke Manifold.
   d. Close kill valve and Open Swab valve on flow head.
   e. Open Flowhead's Master Valve, then wing valve to walk pressure to inlet of the Choke Manifold.
   f. Open Separator inlet valve. Make sure dump lines are lined up to Surge Tanks. Record shut-in tubing pressure, tubing temperature and casing pressure.
   g. Open choke manifold valve to adjustable choke set on approximately 16/64-inch on Choke Manifold.
   h. Increase choke to begin flowing well. Maintain separator pressure at 300-psi while flowing well and observed liquid levels.
   i. Start setting the Separator's levels as the back pressure should be set.
   j. Set level controllers on the Separator and monitor back pressure.
   k. When the Separator back pressure is set and the levels are set and the flow is stable, lower the orifice plate.
   l. Set both level controllers on the Separator and monitor both the Separator back pressure.
3. Begin Flow Test:
   a. Monitor and record the volumes coming back into the P-tanks. Announce when 120-bbls of the base oil have been recovered.

Note: This is 40-bbls prior to getting the 1.6-bbls of 14.2-ppg $CaBr_2$ interface.

   b. Begin Test Phase. Report and record readings minimum every 30-minutes.
   c. Man and Monitor equipment.

Note: Monitor all 3-in lines, particularly the 3-in Inlet line for vibrations during flow operations.

d. Set the injection rate on the defoamer and demulsifier chemicals.

e. Walk the gas line to the flare with a gas detector checking for leaks.

f. Open the manual steam valves on the two steam exchangers and set the temperature controllers at 120-degrees Fahrenheit.

g. Close and lock closed the Oil By-Pass Valve on the Separator.

h. Lock Open the Separator Inlet Valve.

i. Periodically walk the piping of the Production Test Equipment, checking connections with detector.

j. Continue to flow the well on the adjustable choke to the 100-bbl P-tanks through the 3-way valve.

k. Continue flowing the well as directed by Well Test Advisor (MW).

Note: The base oil will be burned and not stored.

Note: Once the choke setting has been established, set the second adjustable choke to the same setting and lock in place.

Note: Oil may be burn off either in a batch or continuous mode. Whenever the pumps are operating they are being continuously monitored.

Note: There are 3 x 100bbl P-Tanks.

Follow the "Oil Burning Procedure" in a step by step process:

4. Light flare pilot:

   a. Open the supply valve on the 250-gal propane tank. The propane tank will be monitored during the course of operations and it has a fire loop on it.

   b. Set the propane tank and air mixture according to the directions on the ignition box.

   c. Using the remote ignition system, engage the button and light the pilot.

   d. Visually confirm the propane burner pilots are lit.

5. Start the air flow to the burner head:

   a. Start four of the 1,500-CFM air compressors and allow to warm up for 5-minutes. (There are six air compressors onboard the rig.).

   b. One at a time, open each air compressors air discharge valve until all four compressors are in operation.

   c. Ensure air flow at the burner head is constant and unobstructed.

6. Start the water screen (Heat suppression system.):
   a. Ensure the water screen manifold system is properly lined up with the valves open to the spray nozzles.
   b. Open the rigs sea water supply valve to the water screen manifold.
   c. Start the water screen jet pump and engage the drive.
   d. Visually inspect the water spray pattern to ensure all nozzles are free from plugging.
7. Line up tank and manifold valves before burning:
   a. Open the inlet valve on the oil manifold at the burn pumps tie in point.
   b. Open the oil discharge on the oil manifold that leads to the flare.
   c. Ensure that the valve that isolates the burn path from the separator path is closed.
   d. Open Oil Tank manual and actuated discharge valves.
   e. Engage the pump to send the oil to the burner.
   f. Visually inspect the burner head to ensure the oil has ignited. If it has not ignited stop the pump and troubleshoot.
   g. If the oil is burning take temperature readings at various rig locations that are exposed to ensure the water screen is adequate.
   h. Continue to burn the oil until the tank reaches approximately 15-barrels.
   i. Shut down the pump then close the oil tank discharge valve.
   j. The Evergreen oil shuttle valve is set to manual mode and will be charged between 50 and 60-psi. When the oil line pressure reaches this point the shuttle will close not allowing any oil to escape from the burner head. This 50 to 60-psi will be trapped in the oil line and must be bled off. This can be done by opening the oil manifold valves that divert back to the Oil Tank.
8. If flare shutdown is needed, follow the following procedure.
   a. Once the well is shut-in and isolated, allow the oil and gas lines to the burner to depressurize and the flare to extinguish.
   b. Do not isolate the Propane to the pilots until all the effluent is completely burned off.
   c. Upon completion of burning, turn off the Propane, Air and Water, in that sequence. This will prevent any fall-out of burning Hydrocarbon droplets into the sea.
   d. Do not close all Gas and Oil diverter valves to the burners. A relief route must be open in the event of an emergency venting.

9. Once gas hits surface, direct the flow to the flare:

Note: **During flaring operations it may be necessary to weather vane the rig to optimize wind direction and burner position. This has to be accomplished in maximum 30-degree increments. Perform this operation by marking the drill pipe and rotary. Then move the rig 30-degrees followed by rotating the drill string 30-degrees in the opposite direction using the rig tongs. The swivel in the flow head should turn during this process since the weight in the elevators should retard movement. Repeat this process until the flare is oriented in the desired heading.**

Note: **Any adjustment of rig heading needs to be communicated to the Enterprise and other vessels in the area prior to rig heading change. Assess the risk of changing heading while flaring, currently there are not foreseen reasons to discontinue flaring.**

10. Hold the flow rate constant until the flow through the system has stabilized. Record the flow rate, pressure, and temperature and the surface choke manifold as well as the subsea readings.

Note: **When rate is stabilized, switch to a fixed choke in order to achieve longer and more stable flow.**

Note: **See Figure 4 through Figure 6 to reference to underbalance and flow operations.**

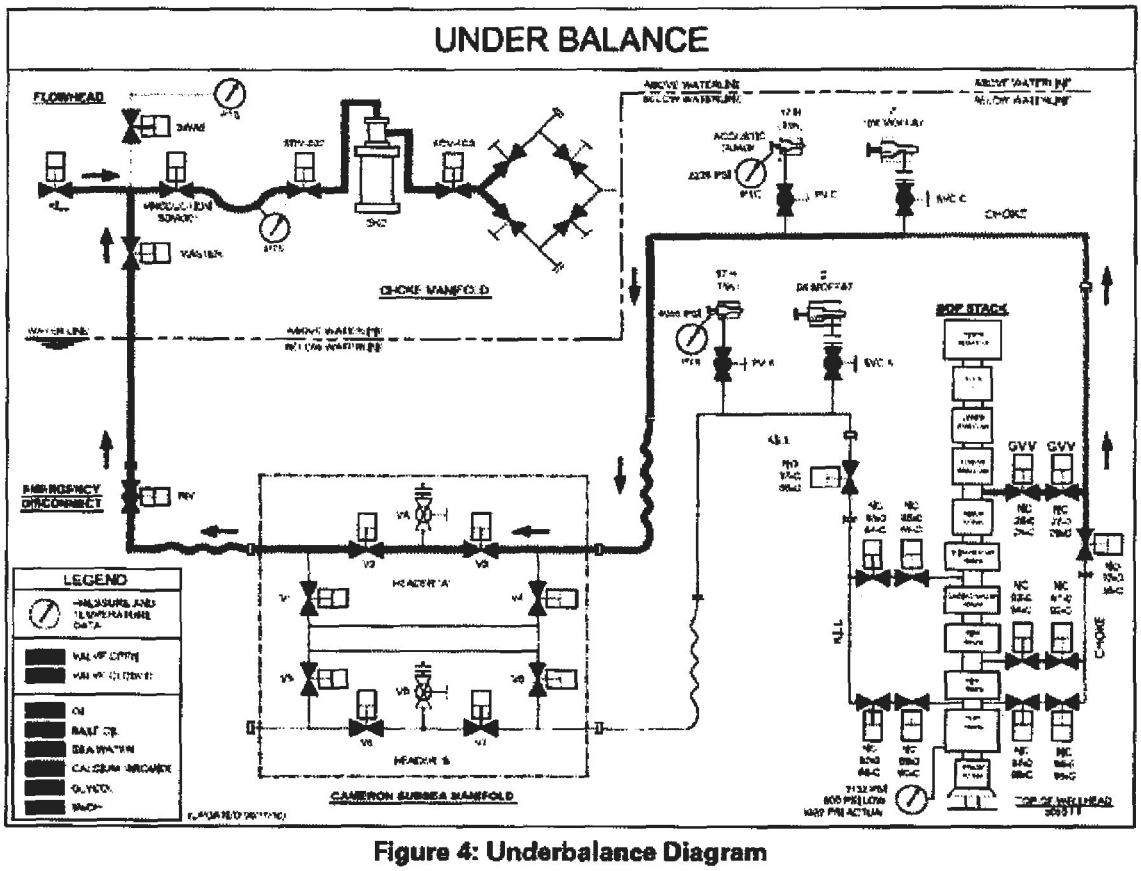

Figure 4: Underbalance Diagram

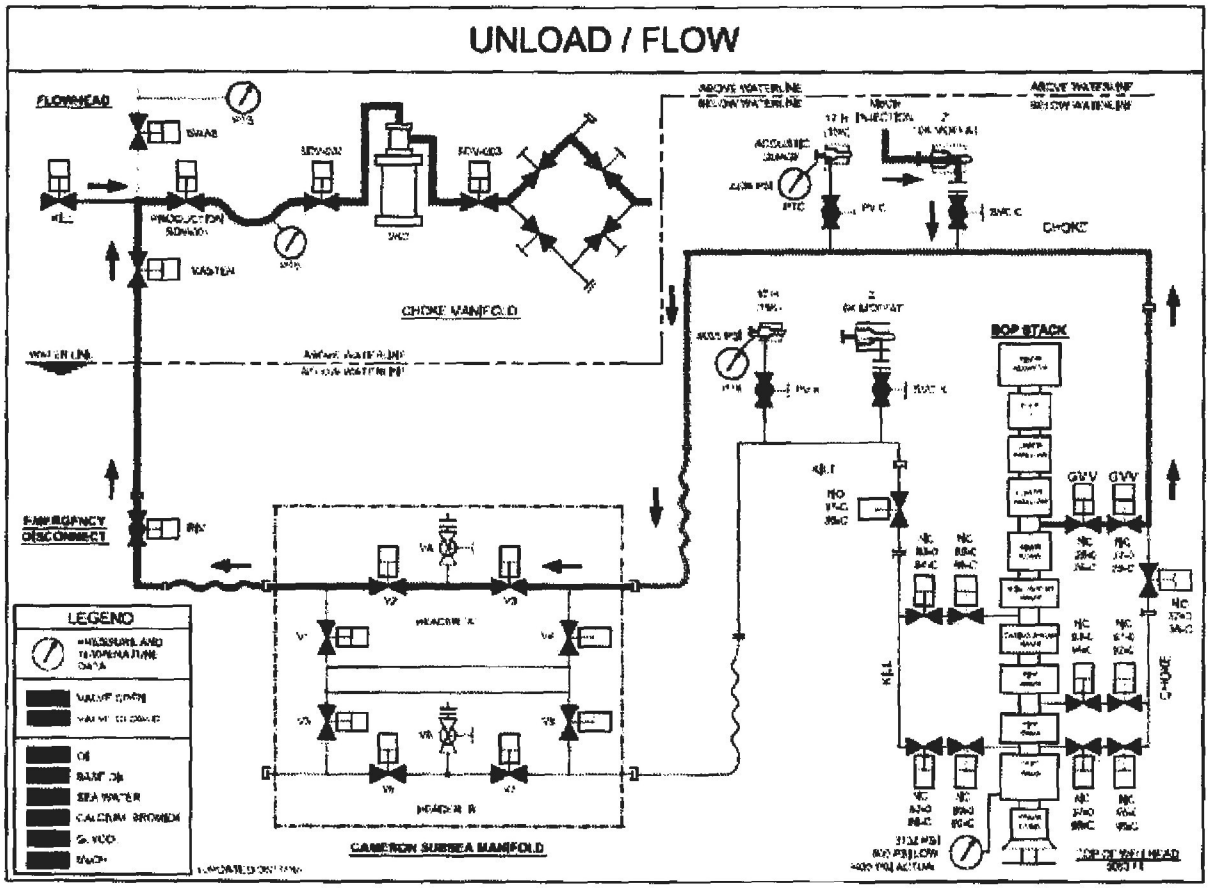

Figure 5: Unload/Flow Diagram

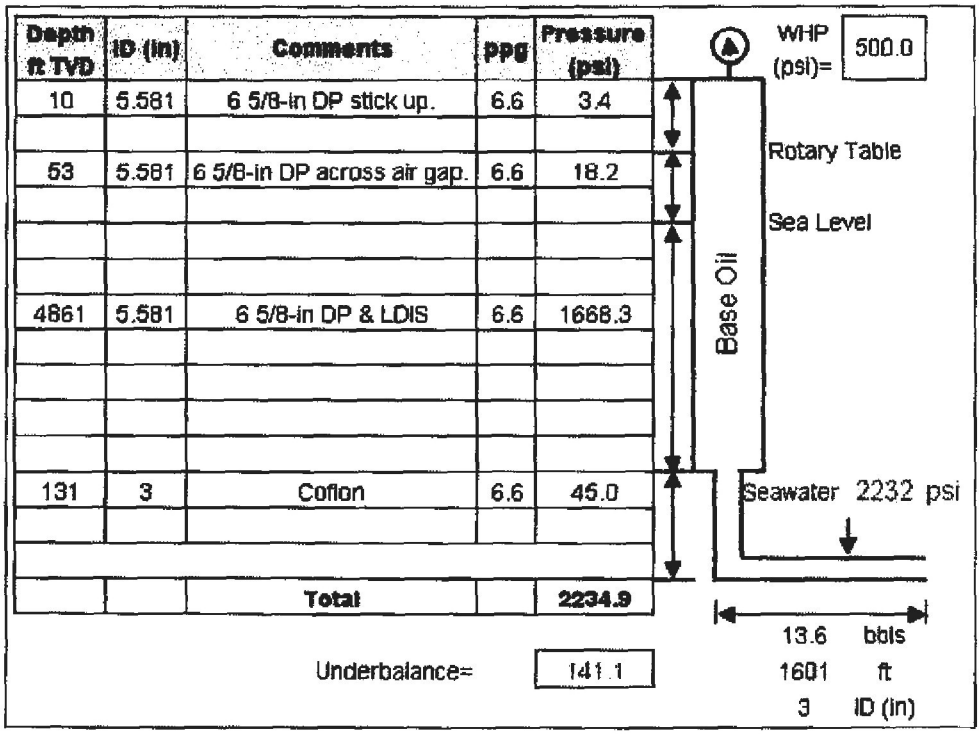

Figure 6: Initial Underbalance

2.5. Increase Flow to Optimum Rate

1. After the well test equipment is lined out continue to open the adjustable choke, 2/64th at a time, monitor for about 30-min to 60-minutes or until stabilized. The goal is to have the rate reach 2,000-bfpd.
2. Record stabilized flow rate, pressure, and temperature at each choke adjustment. This data will be referred to in the event the Q4000 is restarted after a shut-in. Also check for solids in each shake-out to make sure sand isn't being produced.

Note: If solids are produced, inform the Enterprise immediately.

3. In addition random UT wall thickness survey measurements will be taken on a daily basis and the frequency adjusted accordingly based upon flowing parameters.
4. Increase rate by increasing choke opening in 2/64th increments.

3 Flow Back

Containment of MC-252 effluents is managed through the Enterprise Top Hat system and the Helix Q4000 Incineration Process. Normal flowing operations are shown in the following diagram (See Figure 7).

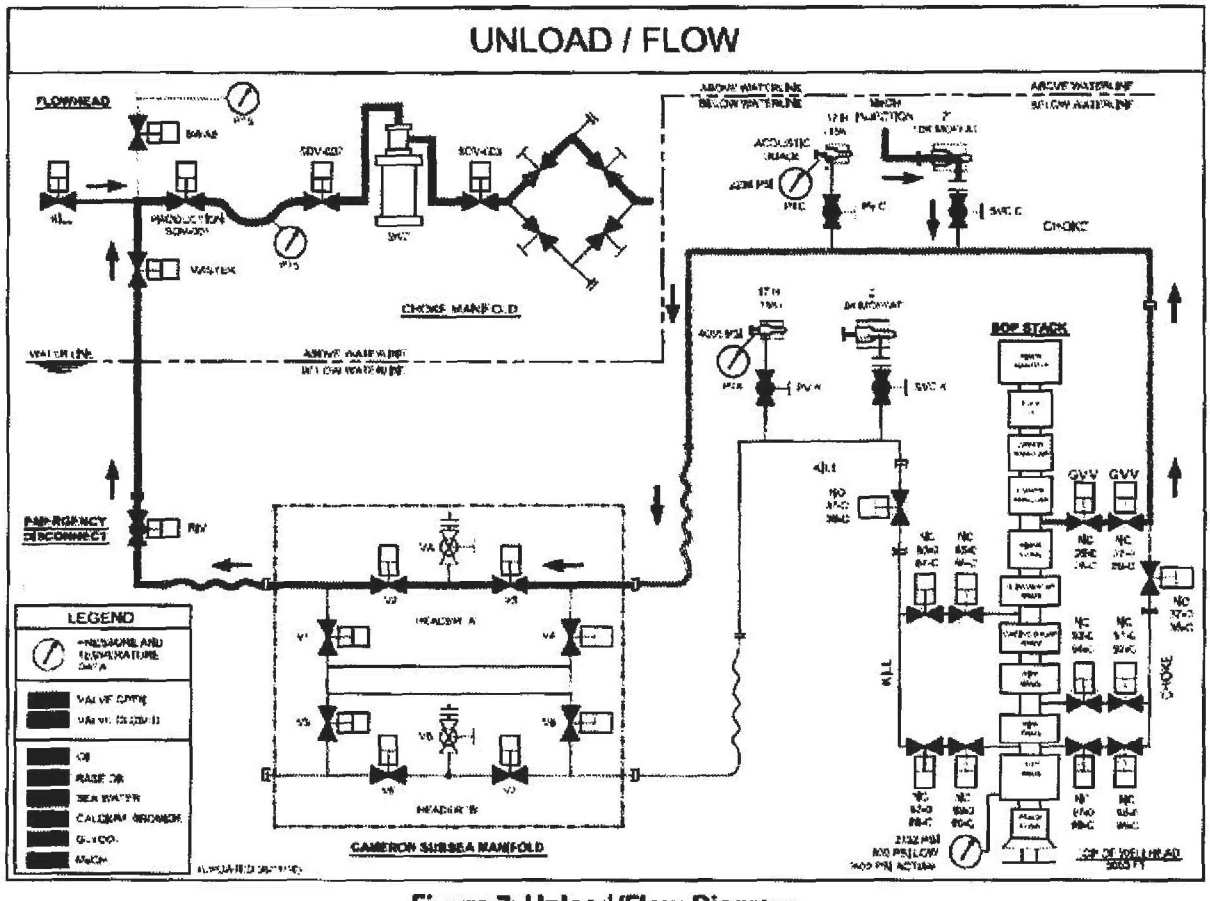

Figure 7: Unload/Flow Diagram

3.1. Maintain Stable Optimum Rate

The Q4000 may incur various stages of shut in periods during flow back operations and they can be classified as either short term or long term. These shut in periods may either be planned or unplanned in nature.

Note: The Q4000 may not restart without the Enterprise on station, Top Hat installed, and methanol injection aligned with the Q4000 flow line. Not having methanol injection into the Q4000 flow line prohibits it from start-up or continuing to flow. Methanol cannot be shut-down to Enterprise or Q4000 during recovery operations.

Note: As long as there is not water in the system, operations can occur without Methanol injection in the Q4000line. However, it is believed that Methanol injection should occur as a preventive measure. Enterprise Methanol injection is critical due to the volumes being produced and the nature of the rig up.

3.2. Planned Short Term Shut-Down

A short term shut down involves a time period less than 6-hours. The flow is shut in at the well test choke manifold on the Q4000. Then the wing valve and master valve on the flow head are closed and the pressure trapped on the subsea flow line system. There is no manipulation of the subsea valves on either the manifold or the Horizon BOP stack. Adjustments of vents on the Top Hat or dispersant injection may need to be made.

Note: See to Figure 8 for reference on Short Term Shut Down.

1. Notify the Enterprise of current status and action plan, so the Enterprise can manage their operations including production upset.
2. Shut down well test operations by closing the flow line wing valve (SDV-001) on the surface flow head.
3. Follow "Normal Shutdown Procedure" to complete the Well Test Equipment shutdown in a controlled manner. Follow this step by step.
4. Bypass PSLs:
   a. At the master panel bypass the PSLs on the flowline segments downstream of the choke manifold.
   b. Bypass the separators PSL at the separator ESD panel.
5. Raise the gas meter orifice plate:
   a. Raise the orifice plate in the Daniels orifice meter.
6. Notify BP Rep. and control room of upcoming shut in:
   a. Notify the BP Rep. of the planned shut in.
   b. Notify the Dynamic Positioning Officer (DPO) of the planned shut in.
7. Shut in the well:
   a. Close the upstream valve on the active side of the choke manifold.
   b. Close the downstream valve on the active side of the choke manifold.
8. Maintain subsea methanol injection to the Enterprise and Q4000 (maximum combine injection rate approximately 8gpm).
9. Isolate the problem, develop a safe action plan, have pre-job safety meeting and correct the problem.
10. Record all pre-shut in pressures and rates for reference during start up procedure.
11. Prior to opening back up for flow, contact the Enterprise and verify that they are ready for the Q4000 to come back on line.
12. Open the wing valve on the flow head to a closed choke. Follow start up / flow back procedures and ramp the well back up to its pre-shut in rates per Section 2.5.

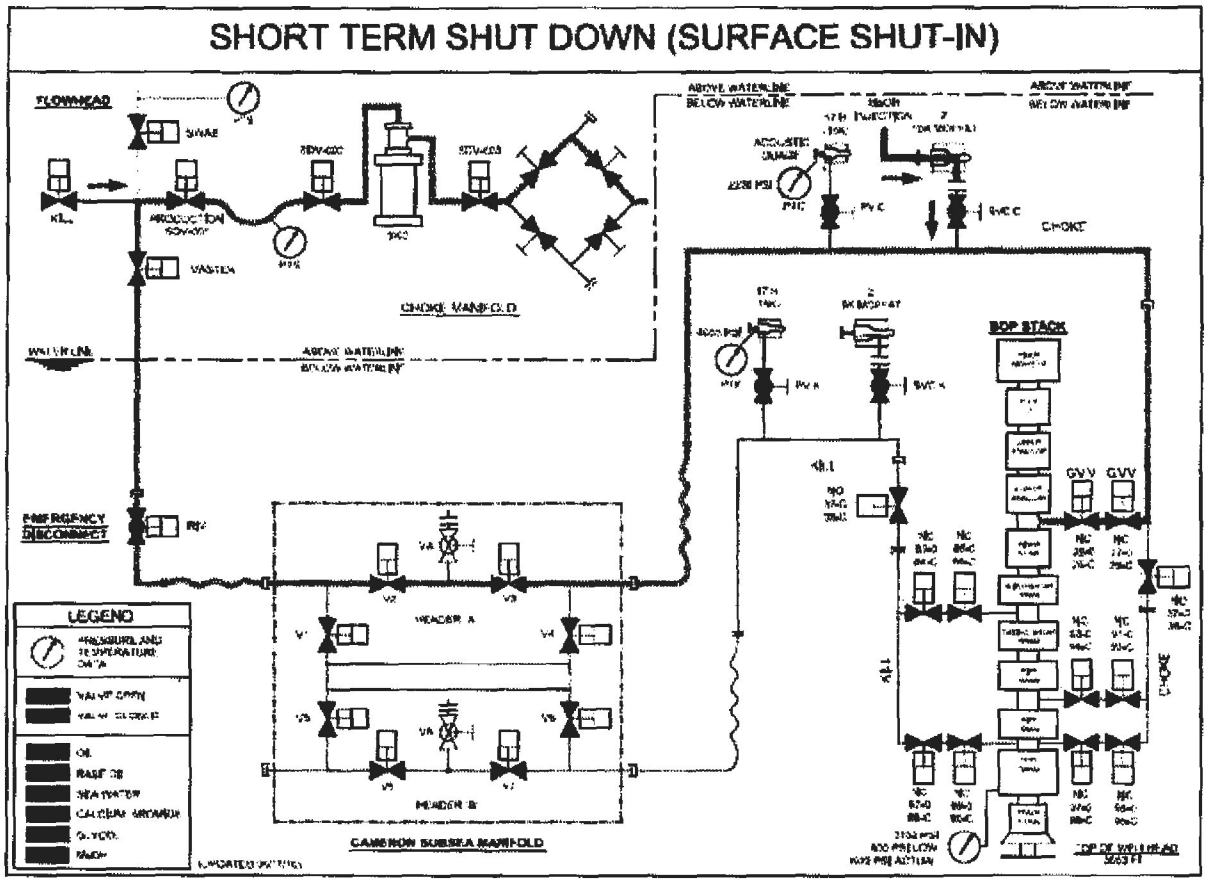

Figure 8: Short Term Shut-down Diagram

3.3. Emergency Shut-Down

In an unplanned shut in such as a drive off situation, the well is shut in at the RIV in the LRA1 of the LDIS and the quick release connector (QRC) is activated. In addition, the Pod Emergency Termination Unit (PETU) of the Horizon BOP is activated.

Note: See to Figure 9 to reference for Emergency Disconnect Shut In.

Close RIV (< 10-sec activation time) see Attachment 10 on the LRA1 as per emergency disconnect procedures.

Note: Notify the Enterprise of current status and action plan.

1. Activate the QRC (70-sec disconnect time) as per emergency disconnect procedures.
2. Use the PETU to close the valves on the Horizon BOP (Inner and Outer GVV).
3. Shut down well test operations by shutting in at the choke manifold followed by closing the wing valve and master valve on the flow head.

4. Follow "Emergency Shutdown Procedure" step by step to complete the well test equipment emergency shutdown in a controlled manner.
5. Emergency shut in:
   a. Pull an ESD station button.
6. Shut down the steam to each boiler:
   a. Manually close the steam outlet valves on each boiler.
7. Shut down chemical injection:
   a. Turn off each chemical pump by closing its air supply valve.
8. Shut down burn operation:
   a. Turn off oil pump.
   b. Shut down air compressors.
9. Shut down water suppression system.
10. Record all pre-shut in pressures and rates for reference during start up procedure.

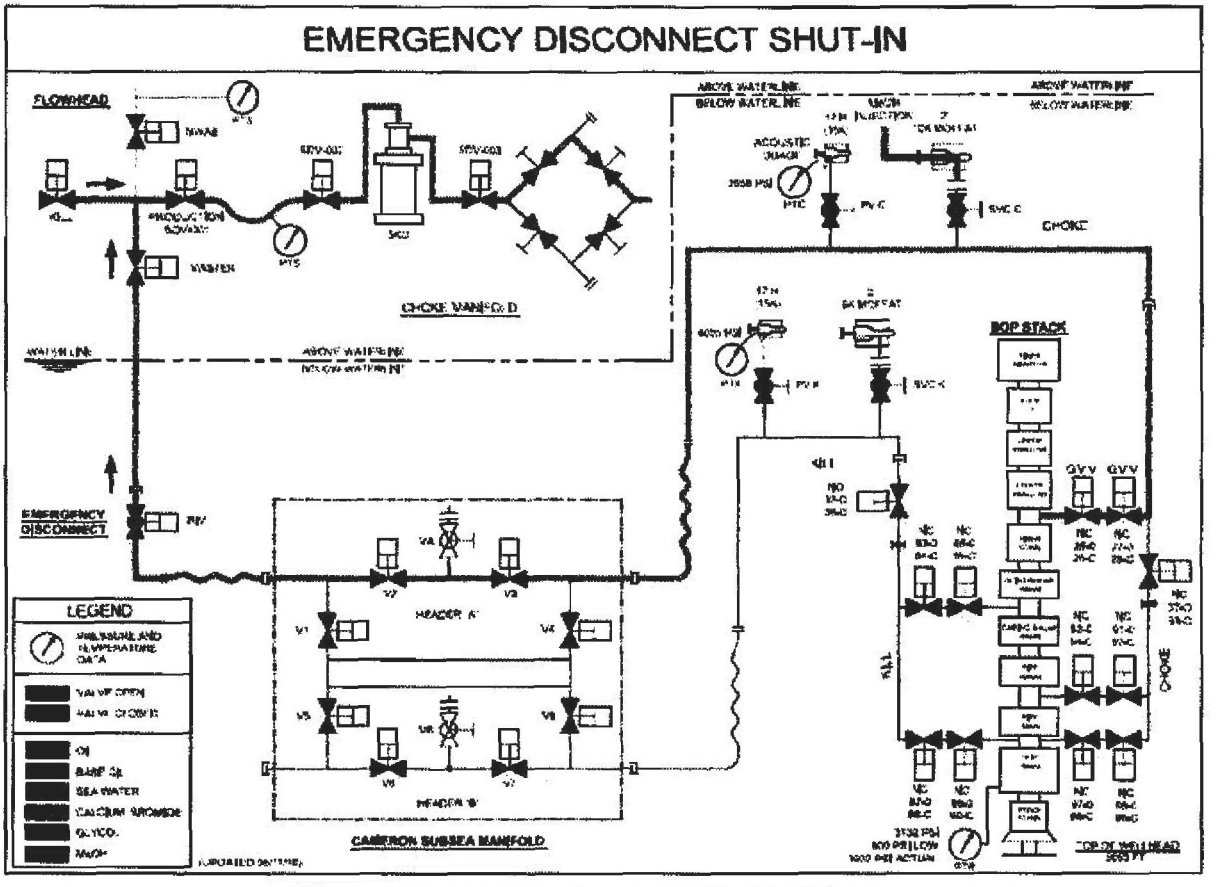

Figure 9: Emergency Disconnect Shut-in Diagram

3.4. Restart After Short Term Shut-Down

The flowline valve on the surface flow head is closed and the pressure trapped on the subsea flow line system. The subsea valves and the manifold or the Horizon BOP stack are open.

1. Review the recovery rate and pressure just prior to shut-in (per Section 1.2), this will be the target rate and pressure for the Q4000 to re-establish flow.
2. Notify the Enterprise that flow to the Q4000 is about to begin.
3. Notify surrounding vessels in field that flaring operations on Q4000 will begin.
4. Confirm that MEOH is being pumped into the Q4000 system.
5. Open the upstream choke manifold valve to the adjustable choke that has been set on a 16/64th choke setting in order to initiate flow.
6. Open choke manifold valve to adjustable choke set on approximately 16/64-inch on Choke Manifold.
7. Increase choke to begin flowing well to the Separator. Monitor Separator pressure and liquid levels.
8. Set the injection rate on the defoamer and demulsifier chemicals.
9. Walk the gas line to the flare with a gas detector checking for leaks.
10. Open the manual steam valves on the two steam exchangers and set the temperature controllers at 120-degrees Fahrenheit.
11. Close and lock closed the Oil By-Pass Valve on the Separator.
12. Lock Open the Separator Inlet Valve.
13. Periodically walk the piping of the Production Test Equipment, checking connections with detector.
14. Continue to flow the well on the adjustable choke to the 100-bbl P-tanks through the 3-way valve.
15. Continue flowing the well as directed by BP.

4 Long Term Shut-Down (LTSD)

A long term shut in involves a time period greater than 6-hours in duration. In a planned shut in, the well is shut in at the surface of the Q4000. All surface volumes of stored hydrocarbon fluids are burned off. The subsea flow line is displaced from surface to the Horizon BOP stack with MEG (55wt% glycol/45wt% drill water mixture). The subsea methanol injection is redistributed to the Top Hat and the gas vent valves on the choke line of the Horizon BOP and valves of the subsea manifold are closed. Adjustments of vents on the Top Hat and dispersant injection may need to be made.

Note: See to Figure 10 to reference to Long Term Shut Down.

1. Shut down well test operations by shutting in at the choke manifold followed by closing the wing valve (SDV-001) and master valve on the flow head.

Note: Notify the Enterprise of current status and action plan.

2. Maintain subsea methanol injection for both Enterprise and Q4000 (maximum combine rate approximately 8-gpm).
3. Record all pre-shut in pressures and rates for reference during start up procedure.
4. Determine a time period to burn off all stored surface hydrocarbon volumes and / or gas pressure from equipment in order to perform safe operations.
5. Verify with the Enterprise that they are ready for the Q4000 to start the subsea flow line displacement.

WARNING: Make it clear to the Enterprise that "MEG (55wt% glycol/45wt% drill water mixture)" will be pumped all the way to the subsea BOP stack and there is a potential for the Enterprise to see this mixture.

6. Make subsea flow line displacement as follows:
   a. Verify that the fluid in the line from the cementing unit to the kill side of the flow head is filled with the MEG (55wt% glycol/45wt% drill water mixture) and that there is at least 200-bbl of useable volume in the pits.
   b. Pressure test line from the cement unit to the kill valve on the flow head to 7,500-psi with MEG (55wt% glycol/45wt% drill water mixture).
   c. Bleed pressure back to 500-psi above the shut in tubing pressure of the flow line side of the surface flow head.
   d. Open the kill valve and master valve on the flow head.
   e. Using the cementing unit, begin bull heading MEG (55wt% glycol/45wt% drill water mixture) down the flow line, through the subsea system, and taking returns through the upper choke valves (GVV) on the Horizon BOP stack into the Enterprise flow stream.
   f. Pump a total of 162-bbls in order to make full flow line displacement to the BOP stack with MEG (55wt% glycol/45wt% drill water mixture).

g. Shut down pump.

h. Discontinue Q4000 methanol injection; do not discontinue Top Hat methanol injection.

i. Close the Outer Gas Vent Valve on the subsea BOP stack (see Figure 10).

j. Close the Inner Gas Vent Valve on the subsea BOP stack (see Figure 10).

k. Pressure test flow line system to 1,000-psi for 15-min, to confirm the Choke Valves (GVV's) are closed and holding.

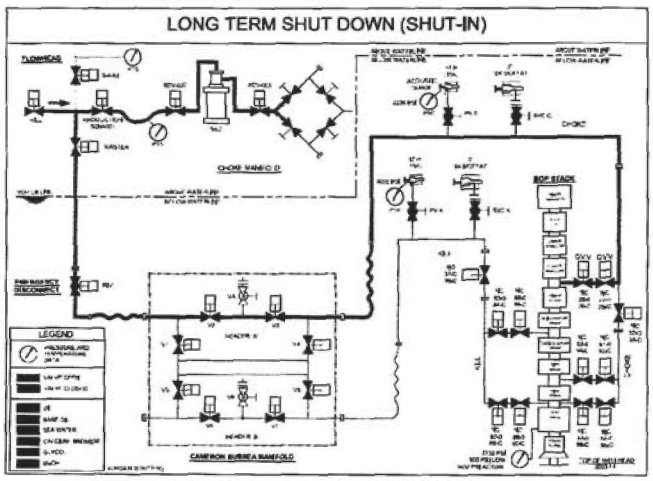

Figure 10: Long Term Shut-down Diagram

7. Depending on the reason for the planned shut in, additional subsea valves such as (RIV, V2, or V3) may need to be manipulated.

8. Flush and purge surface system as required per Section 2.2.

9. See other attachments as necessary:
   - **Attachment 12:** Schlumberger Well Test Process Flow Diagram
   - **Attachment 13:** Critical Isolation Requirements
   - **Attachment 14:** Boarding Pressure vs. Flowrate Curves
   - **Attachment 15:** Cause and Effect / Safe Charts
   - **Attachment 16:** Landing String Specifications
   - **Attachment 17:** Q4000 Contact List
   - **Attachment 18:** Q4000 Shut Down Requirements

4.2. Surface Shut-Down

The well test equipment system should be flushed to remove air/gas and eliminate possibility of creating an explosive mixture when hydrocarbons are introduced when restarting the well. As per Section 2.2.

4.3. BOP Coflexip / Landing String Displacement

The subsea flow system is displaced from the rig floor of the Q4000 to MEG (55wt% glycol/45wt% drill water mixture) with a density of 8.97-ppg.

4.4. BOP Subsea Manifold Isolation

The Outer Gas Vent Valve and the Inner Gas Vent Valve on the subsea BOP stack will be close and pressure tested to 1,000-psi.

4.5. Contingency LTSD (Special Case / Leak Underneath Flowhead Swivel)

There are two cases to be considered when there is a leak on the surface flow head. (1).A leak below the Master valve and (2) A leak above the master valve. Based on the severity of the leak, remediation decisions will be made on site.

4.5.1. *Case 1: Leak below Master Valve*

In this scenario with a leak below the master valve, there is no way to isolate the leak other than closing the RIV and allowing the pressure to bleed off through the well test equipment. Based on the severity of the leak, the decision to displace the subsea flowline back through the 2-in Moffat valve will need to occur on the rig. The wax content is 1.77% and the Wax Appearance Temperature (WAT) is 90-degrees F, but severe wax deposition is not anticipated with severe cooling and time.

1. Isolate the leak by closing the RIV (see Attachment 10) in the LRA1.

Note: During Steps 1 and 2, notify the Enterprise of the situation and actions to be taken.

2. Close the V2 valve on the Cameron subsea manifold with an ROV.

3. Continue to open up the surface choke through the well testing equipment removing the gas cap off of the LDIS landing string as quickly and safely as possible.

4. Make preparations to have the cementer start bull heading down the landing string.

5. Once pressure is bled off, close the surface choke manifold and have the cement unit start loading the LDIS landing string with the 55 / 45 glycol and water mixture.
6. Once pump pressure increase is observed at the cement unit or at the surface choke manifold, shut down the cement unit and monitor for further leaks or pressure increases.
7. If the pressure increase is noticed, open up surface choke manifold to surface well equipment and bleed off pressure to the P-tanks.

Rig to Make Decision on Flowline or No Flowline Displacement.

If Flowline Displacement chosen, follow steps 8-10 below.

8. If the leak will allow the subsea flow line to be displaced, then it should be displaced as follows:
   a. Notify the Enterprise of action plan and have the ROV standing by at the 2-in Moffat valve to open it.
   b. Shut the fail safe wing valve (SDV 001) on the surface tree.
   c. Pressure test the line from the cement unit to the kill valve on the surface tree to 7,500-psi with the 55 / 45 glycol and water mixture and verify that there is at least 200-bbl of useable volume in the pits.
   d. Close the Outer Gas Vent Valve on the Horizon subsea BOP stack.
   e. Close the Inner Gas Vent Valve on the Horizon subsea BOP stack.
   f. Open V2 valve on the Cameron subsea manifold.
   g. Pressure up above the RIV valve with 55 / 45 glycol and water mixture to equalize across it. Open the RIV valve.
   h. Have the ROV open the 2-in Moffat valve.
   i. Using the cement unit, begin bull heading the 55 / 45 glycol and water mixture down the flow line, through the subsea system, and take returns out the 2-in Moffat valve while observing with the ROV.
   j. Once clean glycol water is observed coming out of the Moffat valve, shut down the cement unit and have the ROV close the Moffat valve.
   k. Bleed off any trapped pressure on the surface.
   l. Close the RIV valve.
   m. Change out the surface test tree.
9. RD the coflexip hoses from the surface test tree. Break out the surface test tree and replace with backup tree and test as stated in Section 2.1.
10. Perform displacement and start up as stated in Section 2.3, 2.4, and 2.5.

If No Flowline Displacement chosen, follow steps 11-14 below.

11. If it is determined that the leak is to severe to make the displacement, then leave well isolated with the landing string loaded with 55 / 45 glycol and water mixture and the RIV and V2 valves closed.
12. Formulate a safe action plan and notify the Enterprise of the plan.
13. RD the coflexip hoses from the surface test tree. Break out the surface test tree and replace with backup tree and test as stated in Section 2.1.
14. Perform displacement and start up as stated in Section 2.3, 2.4, and 2.5.

4.5.2. *Case 2: Leak Above Master Valve*

In this scenario with a leak above the master valve, the leak can be isolated by closing the master valve and the RIV valve. The pressure will be bled off through the well test equipment. Based on the severity of the leak, the decision to displace the subsea flowline back through the 2-in Moffat valve will need to occur on the rig. The wax content is 1.77% and the Wax Appearance Temperature (WAT) is 90-degrees F, but severe wax deposition is not anticipated with severe cooling and time.

15. Isolate the leak by closing the master valve on the surface tree followed by closing the RIV (see Attachment 10) in the LRA1.

Note: During Steps 1 and 2, notify the Enterprise of the situation and actions to be taken.

16. Continue to open up the surface choke through the well testing equipment removing the gas cap off of the top of the surface tree master valve as quickly and safely as possible.
17. Make preparations to have the cementer start bull heading down the landing string.

Rig to Make Decision on Flowline or No Flowline Displacement.

If Flowline Displacement chosen, follow steps 18-20 below.

18. If the leak will allow the subsea flow line to be displaced, then it should be displaced as follows:
    a. Notify the Enterprise of action plan and have the ROV standing by at the 2-in Moffat valve to open it.
    b. Shut the fail safe wing valve (SDV 001) on the surface tree.
    c. Pressure test the line from the cement unit to the kill valve on the surface tree to 7,500-psi with the 55 / 45 glycol and water mixture and verify that there is at least 200-bbl of useable volume in the pits.
    d. Close the Outer Gas Vent Valve on the Horizon subsea BOP stack.
    e. Close the Inner Gas Vent Valve on the Horizon subsea BOP stack.
    f. Pressure up above the surface tree master valve with 55 / 45 glycol and water mixture to equalize across it. Open the master valve valve.
    g. Open the RIV valve.
    h. Have the ROV open the 2-in Moffat valve.

i. Using the cement unit, begin bull heading the 55 / 45 glycol and water mixture down the flow line, through the subsea system, and take returns out the 2-in Moffat valve while observing with the ROV.

j. Once clean glycol water is observed coming out of the Moffat valve, shut down the cement unit and have the ROV close the Moffat valve.

k. Bleed off any trapped pressure on the surface.

l. Close the RIV valve.

m. Change out the surface test tree.

19. RD the coflexip hoses from the surface test tree. Break out the surface test tree and replace with backup tree and test as stated in Section 2.1.

20. Perform displacement and start up as stated in Section 2.3, 2.4, and 2.5.

If No Flowline Displacement chosen, follow steps 21-24.

21. If it is determined that the leak is to severe to make the displacement, then leave well isolated with the RIV and master valve closed.

22. Formulate a safe action plan and notify the Enterprise of the plan.

23. RD the coflexip hoses from the surface test tree. Break out the surface test tree and replace with backup tree and test as stated in Section 2.1.

24. Open up the master valve and RIV valve and begin flow back through the well test equipment as stated in Section 2.5.

Reference Documents can be viewed on line on the BP Sharepoint Site. Contact Q4000 Wells Team Leader these documents.

Attachment 1: Enterprise / Q4000 Communication Plan

bp

MACONDO

Q4000 Containment Procedure

for

MC252-1

Discoverer Enterprise / Helix Q-4000
Attachment 1 - Communication Plan

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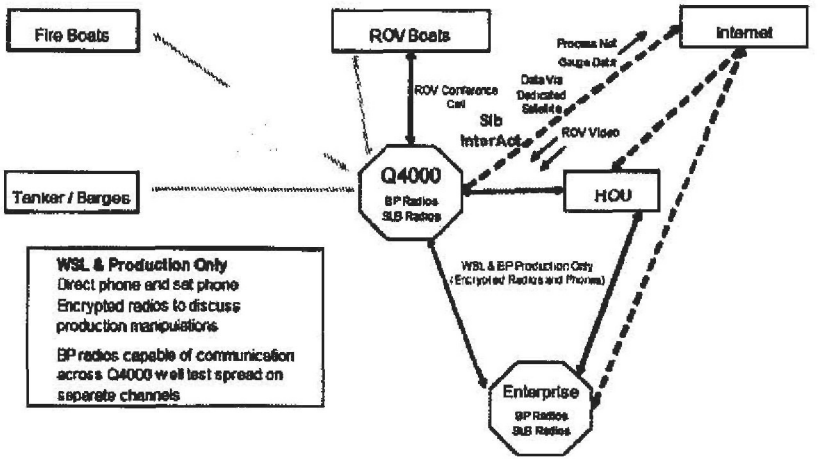
1 Communication Plan

1.1. Introduction

The purpose of this document is to discuss the Q-4000 field communications plan during oil flowback operations on the Q-4000 rig. This document describes the method of communication between the Q-4000 and other vessels in the field, the Enterprise, the ROVs, and the test crew on the deck of the Q-4000, as per the diagram below.

Q-4000 Flowback Communications Diagram



1.2. Communications Equipment and Statement of Requirements

The following requirements are necessary to establish adequate field communication during Q-4000 flow operations:

- Capability to beam an InterAct transmission of production pressure, temperature, rate, and other production data via internet as quickly as possible (real-time) from the Q-4000 to Enterprise and Houston.
- Capability to view acoustic pressure data via Process Net on Q-4000, Enterprise, and in Houston.
- Capability for WSL and BP Production Leads on Q-4000, Enterprise, and in Houston to be able to speak directly to one another on phone and secure radio.

- Capability for ROV operators to be able to speak to one another between Q-4000 and Enterprise (and any other ROV vessels in area).
- Capability for Q-4000 personnel to see the video of each ROV operation.
- 40 intrinsically-safe head-sets for radios dedicated to the Q-4000 and Enterprise flowback operations.
- The well test crews on both Enterprise and Q4000 will have multiple-channel radios, with one channel dedicated to the field leadership. Radios should also have enough channel options to accommodate additional production vessels possibly coming to MC252.

1.3. Vessel SIMOPs

Normal Simops Vessel communication will utilize VHF channels on marine band radio. These vessels include Fire boats and Tankers / Barges. Refer to Table 1, "MC 252 VHF and UHF Communications Plan" at the end of this document for complete information on all vessel communications.

1.4. ROV Operations

The Enterprise and Q-4000 will be conducting ROV operations throughout the start-up, flowback, and shut-down operations, and as such will need to communicate with all ROV vessels. Close communications between the Enterprise and Q-4000 ROVs is essential.

The following summarizes the ROV assignments between Enterprise and Q-4000:

- One Enterprise ROV will be utilized to hook up the methanol injection pigtail to the Choke line goose neck for Q-4000 production. At other times it is utilized to inspect the Enterprise flowback riser, LMRP, etc.
- The second Enterprise ROV will be monitoring the Top Hat Plume on top of the Horizon BOP at all times.
- The Q-4000 Venom ROV will be manipulating the Junk Shot Manifold valves when required, and inspecting the flow path from the Horizon BOP back to the Q-4000 LDIS.
- The second Q-4000 ROV will be used to monitor the Q-4000 LDIS.
- The Scandi Neptune will be using its two ROV's to deploy dispersant in the oil plume at the top of the Horizon BOP.

As in previous Top Kill operations, all ROV monitoring will take place on VHF Channel 10. This information is also found in Table 1.

1.5. Flow Operations

During flow operations, the Enterprise and Q-4000 will use dedicated UHF Channels for communications (e.g. start-up, procedure steps, flow rate optimization, shut-down, etc.) using BP owned radios. Two channels will be repeaters channels (1 and 2), and each rig will have 4 additional dedicated "talkaround" channels for their individual work groups on each rig.

1.5.1. *Critical Communication*

It is critical that one repeater station (Channel 1) be dedicated between the Enterprise and Q-4000 for flowback communication, since unexpected changes in production from either rig can cause sea water contamination and hydrate off either or both of the flow streams.

The second repeater channel (Channel 2) will be used for special purpose communications. The repeaters can be monitored by Houston staff via the base station if both the field and Houston base stations are set on the same channel.

When the Q-4000 is ready to begin burning the hydrocarbons through the flare system, it will be necessary to communicate this action to all vessels in the field via the VHF communications as specified in Table 1.

1.6. Test Deck Crews

The Schlumberger (SLB), FMC, Cameron Controls, and other work groups involved in key operations on the deck of the Q-4000 will be equipped with BP intrinsically-safe radios and head-sets (or throat mics, or temple mics, or mix of all) for use with hard hats and/or fitted masks. Up to 4 work groups can be accommodated with a separate channel for their work group communications when/if required.

As previously mentioned, each rig will have 4 dedicated "talkaround" channels that will be specific to that rig, so that local communications on that rig will not interfere with local communications on the other rig.

During certain critical operations, the WSL can elect for a certain channel to be exclusive for the operation, for all involved work groups to monitor.

Table 1

Email Bridge		NA		NA		NA														
Testing protocol	16		16		15, 16	15	13, 16	16	16	16	16	16	6, 13, 16	16	16	16	16	16	16	16
Bridge to bridge Bridge to boat	9 8,9,16,		15 16, 72 78, 80		13 13		13 6, 16, 16	6, 15 6,77	13 6,17	15 6,17	13 17,69,74	13 78	6 6, 72	6, 13	53	13 81	13.6 6,16	13, 16 13, 16	16, 13 16,16	13
Port crane	9,10		69		67		380-104.0/F	77		67,72	65	NA	72 Ch. 2 467.650	17		NA				
Starboard crane Cranes to boat	9,11 9,11,		65 72, 85		65 Port: 67 Stbd: 69		Deck only 380-104.0/F	NA 77	17	17,72 17	63	74 74	72 Ch. 2 467.650 72	17 17		NA 69	17			
Drill and Sp. Vessels	6, 9, 11		68, 69		72, 84		16	77	6	2,16		74	-	72, 88		UHF 6	72,88			
ROV		8	69	8		72, 88	UHF	6	6	UHF	65	NA	Ch. 1 467.825	VHF 6 UHF 8		NA				
ROV positioning (Same VHF channels	6, 68, 71, 73	10	NA	10	6, 68, 71, 73	10	10 68, 71, 73	68, 67, 73, 74	10 6, 69	10 4, 5, 6	10 66,17,74	10 NA	10	10 6, 69, 71,73	68	68, 72, 74, 76	82, 72, 66, 69			
UHF (All Handheld)	Ch. 16 2 repeater 467.1750/462.1750 Ch. 7 461.8625 Ch. 8 462.5875 Ch. 9 462.5875 Ch. 10 462.7625				Ch. 11 461.8625 Ch. 12 461.8625	11, 12	Ch. 16 2 repeater 467.1750/462.1750 Ch. 3 462.5875 Ch. 4 462.6250 Ch. 5 462.6875 Ch. 6 461.9625													
Helicopter	123.800		126.800		122.700		126.800	123.800	123.800	126.800		123.800	123.800	Ch. 1 467.825 Ch. 3 467.850						
Shoreline Bases			11				UHF							123.800						
Medic							UHF	72		146	63									
Harvey Transfer bag or ROV	15, 16																			

Table 1 (cont.)

Boat Bridge Rolling ground										16	16				16
Bridge to Bridge Bridge to boat	6, 13	6, 13 6	13	13 13	72	6,13 14				13	13	90				13
Port crane		72				14									
Starboard crane		n/a		68		14									
Crane to boat		72		68		14									
Bulk and liq. transfer		72		69		14 UHF Ch.7 458.1750									
ROV		n/a		UHF		12									
ROV monitoring spare VHF channels		17, 77	10	10 6,66,71	16	10 11									
UHF		Ch. 7: 467.8375 Ch. 8: 467.8625		Ch.1 461.8625 Ch.3 462.8125 Ch.6 467.8125		Ch.1 [illegible] Ch.2 [illegible] Ch.3 [illegible] Ch.4 [illegible] Ch.5 [illegible] Ch.6 [illegible] Ch.7 458.1750 Ch.8 [illegible] Ch.9 [illegible] Ch.10 462.5500 Ch.11 462.5750 Ch.12 462.6000 Ch.13 462.6250 Ch.14 462.6500 Ch.15 462.6750 Ch.16 462.7000		TX467.575 / RX467.575 TX467.600 / RX467.600 TX467.625 / RX467.625 TX461.3125 / RX461.3125 TX467.650 / RX467.650 TX467.675 / RX467.675 TX467.525 / RX467.525 TX467.550 / RX467.550			467.525 50W 467.550 40W 467.575 467.600			
Helicopter				123.05		123.05									
Remote tones						UHF Ch.6 458.1625									
Medic				UHF		UHF Ch.7 458.1750									

Table 1 (cont.)

Motorola Talkies Channel No.	Transmitting Frequencies (MHz)	Channel No.	Frequency	Channel Designator	Channel no.	Frequency	Channel no.	Frequency	Location	Channel no.	Frequency	
1	156.050	1	456.025	68	1	TX457.375 / RX457.375	1	456.0250	Subsea	1	Tx 457.375	Rx 452.375
2	156.075	2	456.050	71	2	TX457.400 / RX457.400	2	456.0500	Port Crane	2	Tx 457.375	Rx 452.375
3	156.100	3	456.075	72	3	TX457.425 / RX457.425	3	456.0750	Stb. crane	3	Tx 458.000	Rx 458.000
4	156.125	4	456.100	74	4	TX461.3125 / RX461.3125	4	456.1000	Knuckle-boom crane	4	Tx 454.000	Rx 454.000
5	156.150	5	456.125	5	5	TX457.500 / RX457.500	5	456.1250	Drill floor			
6	156.200	6	456.150	6	6	TX457.575 / RX457.575	6	456.1500	Drill floor			
7	156.075	7	456.175	77	7	TX457.525 / RX457.525	7	456.1750	Bridge (emergency			
8	156.400	8	456.200	8	8	TX457.550 / RX457.550	8	456.2000	Technical dept.			
9	156.450	9	456.225	9			9	456.2250	Technical Dept.			
10	156.500	10	456.250	10			10	456.2500	Spare			
11	156.550	11	456.275	11			11	456.2750	Spare			
12	156.600	12	456.300	12			12	456.3000	Spare			
13	156.650	13	456.325	13			13	456.3250	Spare			
14	156.700	14	456.350	14			14	456.3500	Spare			
15	156.750	15	456.375	15			15	456.3750	Spare			
16	156.800	16	456.400	16			16	456.4000	Spare			

Notes:

SIMOPS Director onboard DD III monitors VHF ch. 06 and ch. 13.

All ROV's monitor VHF Ch. 16.

Perform radio check prior to startup of all operations.

Communications plan is a guideline and needs to be adjusted in the field as conditions dictate.

Remember to keep radio traffic to the essentials since there is a high demand for VHF.

Cleanup vessels work on channel 6, 13, 15, 16, 68, 71 and other channels as requested. Some vessels may have limitations in channel availability above minimum requirements.

Harvey Thunder or AHV to support the Discoverer Enterprise and the PO as a backup and works on ch. 13 and ch. 15.

Future tanker and barge operations for Discoverer Enterprise support to use VHF ch. 13 and 15 to call up and then agree with respective vessel on channel selection.

Radio check all members prior to start pumping operation.

Check hand held battery charge.

Check available charged spare batteries.

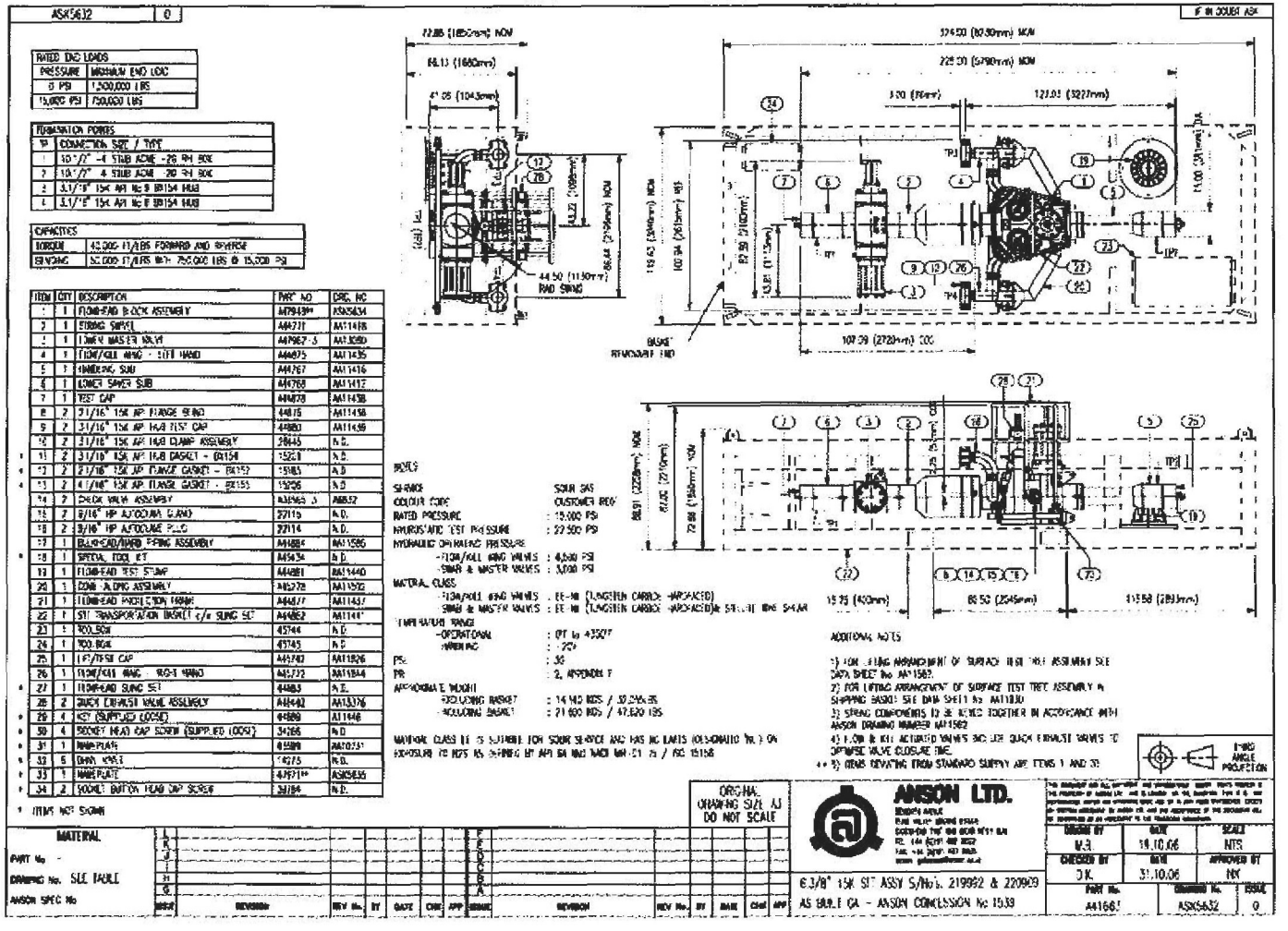
Check availability charge stations.

Check for spare hand held radios.

DD II monitors Ch. 7 456.175 and Ch. 11 452.075.

DD III monitors Ch. 2 456.075, Ch. 6 456.150 and Ch. 9 452.025

Attachment 2: 6.3/8-in 15K Surface Test Tree Assembly



Attachment 3: Schlumberger Spare Equipment List

WT Spare Parts.xls

Schlumberger — **Steam Heat Exch / STX-CCN**

Optional Spares

Part No.	Description	Qty	UN. VALUE	TOT. VALUE
P494669	FIXED CHOKE CONVERSION KIT FOR ADJUSTABLE 3 -15K	1		$ -
[illegible]	[illegible]	1		$ -
G827806	WRENCH FOR BEANS AND SEAT DIA 2	1		$ -
G829886	BLANK CHOKE BEAN FOR CHOKE 3 1/1610 K MALBRANQUE	1		$ -
M830103	CHOKE BEAN DIA. .1/8 TUNG.CARBIDE	1		$ -
M830104	CHOKE BEAN DIA. .1/4 TUNG.CARBIDE	1		$ -
M830105	CHOKE BEAN DIA. .3/8 TUNG.CARBIDE	1		$ -
M830106	CHOKE BEAN DIA. .1/2 TUNG.CARBIDE	1		$ -
M830107	CHOKE BEAN DIA. .5/8 TUNG.CARBIDE	1		$ -
M830108	CHOKE BEAN DIA. .3/4 TUNG.CARBIDE	1		$ -
M830109	CHOKE BEAN DIA. 1. TUNG.CARBIDE	1		$ -
M830200	CHOKE BEAN DIA. 1,1/4 TUNG.CARBIDE	1		$ -
M830201	CHOKE BEAN DIA. 1.1/2 TUNG.CARBIDE	1		$ -
M834303	CHOKE BEAN DIA. .3/16 TUNG.CARBIDEMALBRANQUE REF1992	1		$ -
M834304	CHOKE BEAN DIA. .5/16 TUNG.CARBIDE	1		$ -
M834305	CHOKE BEAN DIA. .7/16 TUNG.CARBIDE	1		$ -
M834306	CHOKE BEAN DIA. .9/16 TUNG.CARBIDE	1		$ -
M834307	CHOKE BEAN DIA. .7/8 TUNG.CARBIDE	1		$ -
P708336	CHOKE BEAN DIA. 2 TUNG.CARBIDE	1		$ -
TOTAL				$ -

M&S Spares

Part No.	Description	Qty	UN. VALUE	TOT. VALUE
G820083	STUD BOLT M 20 X 130 A193 B7 COMNUT A194 2H CDM	24		0
B078747	GASKET 6-300LBS,ASBESTOS FREE,METAFLEX SPG	2		$ -
G820072	GASKET 2. ASA 600LBSMETAFLEX SG	6		$ -
G820175	RIVET R 4 X 8 19/10	8		$ -
G823095	NUT H M24 ,A2/70, NF E25-401	4		$ -
G828033	SCREW,H M24 - 70 A2/70 - NF E25-114	4		$ -
G822915	WASHER W 24 , A4, NF E25-515	4		$ -
G823795	JOINT .3/4 ASA KLINGERITE	1		$ -

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WT Spare Parts.xls

Part No.	Decription	Qty	UN. VALUE	TOT. VALUE
G 822418	Register assy	1		$ -
G 822419	Register gasket	2		$ -
G 822420	Gear case adapter assy	1		$ -
G 822421	O ring	5		$ -
G 822422	O ring	5		$ -
G 822423	Nut, bearing	1		$ -
G 822424	Rotor, bearing	1		$ -
G 822425	Wear plate	1		$ -
G 822426	Drive gear 24 teeth	1		$ -
G 822427	Driven gear 27 teeth	1		$ -
G 822430	Bridge assy	1		$ -
G 822431	Bridge seal	2		$ -
G 824870	Magnetic coupling assy	1		$ -
G 828702	Rotor hub assy	2		$ -
	ROTRON METER 3"			
G 822345	O ring	5		$ -
G 822346	Spirol pin	5		$ -
G 822359	Magnet assy	1		$ -
G 822404	Shaft and rotor assy	1		$ -
G 822406	Spirol pin	5		$ -
G 822407	Bearing, sleeve type, Graphitor III	2		$ -
G 822409	O ring	5		$ -
G 822410	O ring	5		$ -
G 822411	O ring	5		$ -
G 822412	Counter	1		$ -
	BARTON RECORDER			
G 822444	Red ink	1		$ -
G 822445	Blue ink	1		$ -
G 822446	Green ink	1		$ -
G 822447	Static pen	1		$ -
G 822448	Differential pen	1		$ -
G 822449	Temp. pen	1		$ -
G 822452	Arm, fountain pen	1		$ -
G 822454	Turret, Macnick chart drive	1		$ -
G 822456	Door gasket	1		$ -
G 822457	Chart hub	1		$ -
G 822458	Hex key	1		$ -
G 822462	Element, static pressure 1500 psig	1		$ -
G 822468	Pen cleaning wire	1		$ -

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WT Spare Parts.xls

Part No.	Decription	Qty	UN. VALUE	TOT. VALUE
G 822472	Gasket	1		$ -
G 822474	Diferential spring 100"	1		$ -
G 822475	Differential spring 200"	1		$ -
G 822477	Differential spring 400"	1		$ -
G 823632	Chart, box	1		$ -
G 823634	Door glass	1		$ -
	DANIEL ORIFICE METER			
G 821028	Orifice plate sealing ring (teflon)	2		$ -
G 821029	Grease gun	1		$ -
G 821030	Grease, box	1		$ -
G 822022	Equalizer valve	1		$ -
G 822034	Valve strip	1		$ -
G 822039	Plate carrier	1		$ -
G 822040	Orifice plate sealing ring (rubber)	2		$ -
G 822041	Sealing bar gasket	5		$ -
G 822058	Bleeder valve complete	1		$ -
G 822065	Clamping bar screw	6		$ -
G 822069	Clamping bar	1		$ -
G 822098	Valve spring	6		$ -
G 822105	Valve seat	1		$ -
G 822106	Valve seat gasket	2		$ -
G 822110	Grease seal check valve	1		$ -
G 822161	Sealing bar	1		$ -
G 823696	Operating wrench	1		$ -
	SIGHT GLASS			
G 820900	Flat glase type 3T25	2		$ -
G 824880	Asbestos seal	4		$ -
G 824879	Asbestos-neoprence seal	4		$ -
G 824881	Flat glass type 3T19	2		$ -
G 824882	Asbestos-neoprance seal	4		$ -
G 824883	Asbestos seal	4		$ -
G 825577	Inner seal (600psi separator)	4		$ -
G 825578	Outer seal (600psi separator)	4		$ -
M 802884	Cock type 1 (600psi separator)	1		$ -
M 806131	Cock type 1	1		$ -
M 806326	Cock type 2 (600psi separator)	1		$ -
M 806365	Cock type 2	1		$ -
TOTAL				$ -

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WT Spare Parts.xls

Schlumberger — **Separator / SEP - G**

Optional Spares

Part No.	Description	Qty	UN. VALUE	TOT. VALUE
P700064	SET OF 11 ORIFICES FOR ORIFICE METER 2-600	1		$ -
[illegible]	[illegible]	1		$ -
B077009	NEEDLE VALVE, FF, 1/2 NPT 250BARH2S WP SST	4		$ -
G821228	NUT H M12 A2/70, NF E25-401	2		$ -
G820825	NIPPLE M .1/2 NPT X M .1/2 NPTA105 3000LBS	6		$ -
G821372	GASKET .1/2 ASA 600LBSMETAFLEX SG	2		$ -
G822183	TEE FFF .1/2 NPT A105 3000LBS	2		$ -
G822274	SCREW,H M12 - 30 A2/70 - NF E25-114	2		$ -
G823423	UNION M .1/2 NPT X F .1/2 NPTA105 3000LBS	1		$ -
G823700	NUT H M 5 ,A2/70, NF E25-401	15		$ -
G826176	SCREW,H M 5 - 10 A2/70 - NF E25-114	15		$ -
G827585	TIGE FIL.BRIDE M 14 X 80 A193 B7 CDM/ECROUS A194 2H CDM	8		$ -
G829850	MANOMETER 100MM.1/2 NPT 2000PSI 150 B.H2S BACK FITTING	1		$ -
M872606	BOTTLE SHRINKAGE TESTER CAPACITY 4 L 1440 PSI WP H2S	1		$ -
M811843	THERMO WELL , M 3/4 NPT X F .1/2 NPT -H2S- 5000PSI	1		$ -
B076076	GLASS NIR WITH GASKET FOR 5IRS SIGHTGLASS-LEVEL	3		$ -
[illegible]	[illegible]	1		$ -
G822221	U.BOLT DIA.12 MM TUBE 6, ACIER GALVANISE	2		$ -
B077009	NEEDLE VALVE, FF, 1/2 NPT 250BARH2S WP SST	5		$ -
G820276	NUT H M 6 ,08 , NF E25-401/CD10/C/FE	2		$ -
G820303	WASHER W 6, 8.8, NF E25-515	2		$ -
G820376	ADAPTOR M .1/2 NPT X F .1/4 NPTA105 6000LBS	1		$ -
G820826	NIPPLE M .1/2 NPT X M .1/2 NPTA105 3000LBS	10		$ -
G821373	GASKET .3/4 ASA 600LBSMETAFLEX SG	2		$ -
G821727	CROIX F .1/2 NPT A105 3000LBS	1		$ -
G822183	TEE FFF .1/2 NPT A105 3000LBS	2		$ -
G822235	STUD BOLT, M 16 X 100 A193 B7 CDM NUT A194 2H CDM	8		$ -
G823221	BALL VALVE FF 1/2NPT SST H2S WP 100BAR	2		$ -
G823293	BLIND POP RIVET,DOME HD 3MM DIA X 10MM LG SST	4		$ -
G823400	SCREW,H M 6 - 15 8.8 - NF E25-114/CD10/C/FE	2		$ -
G823459	GOUPILLE ELASTIQUE E 2.5 X 10 MM 1/98	1		$ -
G823967	UNION M .1/2 NPT X 8 - 10 MMSST 316	4		$ -
G823975	ETRIER FIL. DIA.10 MM TUBE 2.1/2 ACIER GALVANISE	2		$ -
M807589	THERMO WELL , M .1/2 NPT X F .1/2 NPT -H2S- 10000PSI	1		$ -

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WT Spare Parts.xls

Part No.	Decription	Qty	UN. VALUE	TOT. VALUE
M807425	LEVEL GLASS GAUGES WITH NEEDLE VALVES	1		$ -
M806131	NEEDLE VALVE FLG.3/4-600RF MALE.3/4NPT H2S	2		$ -
M810735	LEVEL GLASS GAUGES TYPE R H2S 100B WP.	1		$ -
P487874	CLASS 300 FLANGE GASKETS SET	0		$ -
B078256	GASKET 3 300LBS,ASBESTOS FREE,METAFLEX SPG	0		$ -
B078257	GASKET 4 300LBS,ASBESTOS FREE,METAFLEX SPG	0		$ -
B079018	GASKET 2 300LBS,ASBESTOS FREE,METAFLEX SPG	0		$ -
B079399	GASKET 18 300LBS,ASBESTOS FREE,METAFLEX SPG	0		$ -
B079743	GASKET 1/2 300LBS,ASBESTOS FREE,METAFLEX SPG	0		$ -
B079744	GASKET 3/4 300LBS,ASBESTOS FREE,METAFLEX SPG	0		$ -
B079745	GASKET 1 300LBS,ASBESTOS FREE,METAFLEX SPG	0		$ -
B079746	GASKET 1-1/2 300LBS,ASBESTOS FREE,METAFLEX SPG	0		$ -
B079747	GASKET 6-300LBS,ASBESTOS FREE,METAFLEX SPG	0		$ -
P487876	SEAL RINGS SET FOR WECO FIG 602/1002/1502	0		$ -
B078253	SEAL RING,4 VITON,WECO FIG.602,1002,1502.	0		$ -
B079763	SEAL RING,6 VITON,WECO FIG.602,1002,1502.	0		$ -
B079796	SEAL RING,2 VITON,WECO FIG.602,1002,1502.	0		$ -
G822174	SEAL RING 3 VITON,WECO FIG.602,1002,1502.	0		$ -
[illegible]	LGMS-A "REPLACED BY LGMS-C" LOW GAS FLOW METERING SKI	1		$ -
G820633	BALL VALVE FF 1/4NPT SST H2S WP 100BAR	1		$ -
G823221	BALL VALVE FF 1/2NPT SST H2S WP 100BAR	5		$ -
M834313	BOX POLYESTER FOR BARTON	1		$ -
P778944	REPAIR KIT FOR BALL VALVE 3 IN. 32 TO 212 DEG. F	1		$ -
P778941	REPAIR KIT FOR BALL VALVE 1 IN. 32 TO 212 DEG. F	1		$ -
M838888	THERMOWELL BARTON 1NPT X 1/2NPT	1		$ -
P585994	LEVEL GLASS 2R REFLEX	1		$ -
P784798	BARTON RECORDER 202N-3RS STD TEMP 1440PSI WP.	1		$ -
B079067	BOX OF 6 PENS 1ST BLUE,FOR BARTON 208N	1		$ -
B079068	BOX OF 6 PENS 2ND RED,FOR BARTON 208N	1		$ -
B079069	BOX OF 6 PENS 3RD GREEN,FOR BARTON 208N	1		$ -
B079070	BOX OF 6 PENS 4TH PURPLE,FOR BARTON 208N	1		$ -
G822448	PEN FOUNTAIN 2ND (DIFFERENTIAL)	1		$ -
G822475	SPRING ASSY 0,200 WC	1		$ -
G829928	FELT PEN 1 ST COLOR RED	1		$ -
TOTAL				$ -

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WT Spare Parts.xls

Part No.	Decription	Qty	UN. VALUE	TOT. VALUE
	M&S Spares			
Part No.	**Decription**	**Qty**	**UN. VALUE**	**TOT. VALUE**
100277880	BALL VALVE 1/4 IN. NPT, F X F, H2S, 3000 PSI	4		$ -
100277881	BALL VALVE 1/2 IN. NPT F X F, H2S, 2000 PSI	13		$ -
B078595	GAUGE,PRESS.0-16BAR DIA=50,1/4NPT.SST	1		$ -
B079787	CHECK VALVE 1/4NPT M/M.SST 316.150PSI	1		$ -
B079788	PRES.CONTROL VALVE 1/4NPT.M/F.0,7-15BAR.SST	1		$ -
M812360	THERMOMETER DN100 1/2NPT 0-160 DEG.C/30-320 DEG.F SST	2		$ -
M802665	BARTON FLOWRECORDER 2 H2S 1000PSI	1		$ -
M834313	BOX POLYESTER FOR BARTON	1		$ -
M834314	TRANSPORTATION BOX FOR DANIEL 6 IN. POLYESTER	1		$ -
P778942	REPAIR KIT FOR BALL VALVE 1.1/2 IN. 32 TO 212 DEG. F	1		$ -
P778943	REPAIR KIT FOR BALL VALVE 2 IN. 32 TO 212 DEG. F	1		$ -
P778944	REPAIR KIT FOR BALL VALVE 3 IN. 32 TO 212 DEG. F	1		$ -
P779269	PRESSURE GAUGE 160 BARS 2300 PSI-1/2NPTM-100 MM DIA	1		$ -
P779488	THERMOWELL 3/4NPT X 1/2NPT STAINLESS STEEL L:157 MM	1		$ -
P783445	CHECK VALVE 2 600 ANSI (H2S)	1		$ -
P783898	MULTIPORT GAUGE VALVE 1/2NPT MALE/FEMALE 10K H2S	3		$ -
P783906	NEEDLE VALVE 1/2 IN. NPT, M X F, H2S, 6000 PSI	3		$ -
P778947	REPAIR KIT FOR GLOBE VALVE 2"	1		$ -
M802311	GLASS LEVEL INDIC. 3 T 25 .3/4 H2S100B WP T.S.	1		$ -
M833333	SIGHT GLASS LEVEL 3/4 3 T 19 100B WPH2S T.S	1		$ -
M838888	THERMOWELL BARTON 1NPT X 1/2NPT	1		$ -
M838889	SAMPLING WELL 3/4NPT X 1/2NPT L:150 MM	1		$ -
[illegible]	ROTRON FLOWMETER 3 ASA 600# H2S 1440PSI S.T.	1		$ -
G822404	TOTALIZER+ANALOG FLOW RATE INDICATOR ROTRON NSH	0		$ -
G822405	SHAFT ROTOR 17.4 HP FOR ROTRON 3-4	1		$ -
G822409	SEAL O-RING SIDE COVER (VITON),ROTRON 3 4	1		$ -
[illegible]	FLOCO FLOWMETER N° 2 ASA 600 H2S 1440PSI S.T.	2		$ -
B077670	2 FLOCO ROTOR ASSY FOR F 2500-2	1		$ -
G822426	CALIBRATION DRIVE GEAR 24TEETH, FLOCO F 2500-2	1		$ -
G822427	CALIBRATION DRIVE GEAR 27TEETH, FLOCO F 2500-2	1		$ -
[illegible]	THERMO WELL F 1/2NPT FLANGE1.1/2ASA 600 H2S 1440PSI	1		$ -
M809274	PUITS THERMO. M .3/4 NPT X F .1/2 NPT -H2S- 1440PSI	1		$ -
M809275	BRIDE SPCL 1.1/2 ASA 600LBS .3/4 LP A105 GR2	1		$ -
[illegible]	SET OF 10 ORIFICE PLATES H2S 304SSFOR DANIEL 6	1		$ -

WT Spare Parts.xls

Part No.	Description	Qty	UN. VALUE	TOT. VALUE
G824400	ORIFICE PLATE 1.750 FOR DANIEL 6 H2S 304SS T=.	1		$ -
G824401	ORIFICE PLATE 3.500 FOR DANIEL 6 H2S 304SS T=.1/8	1		$ -
G824402	ORIFICE PLATE 3.250 FOR DANIEL H2S 304SS T=.1	1		$ -
G824403	ORIFICE PLATE 3.000 FOR DANIEL 6 H2S 304SS T=.	1		$ -
G824404	ORIFICE PLATE 2.750 FOR DANIEL 6 H2S 304SS T=.	1		$ -
G824405	ORIFICE PLATE 2.500 FOR DANIEL 6 H2S 304SS T=.	1		$ -
G825335	ORIFICE PLATE 1.500 FOR DANIEL 6 H2S 304SS T=.1/8	1		$ -
G825336	ORIFICE PLATE 2.000 FOR DANIEL 6 H2S 304SS T=.	1		$ -
G825337	ORIFICE PLATE 2.250 FOR DANIEL 6 H2S 304SS T=.	1		$ -
G825338	ORIFICE PLATE 3.750 FOR DANIEL 6 H2S 304SS T=.	1		$ -
G825339	ORIFICE PLATE 4.000 FOR DANIEL 6 H2S 304SS T=.1/8	1		$ -
G825340	ORIFICE PLATE 4.250 FOR DANIEL 6 H2S 304SS T=.1/8	1		$ -
G825341	ORIFICE PLATE 4.500 FOR DANIEL 6 H2S 304SS T=.1/8	1		$ -
[illegible]	LEVEL CONTROLLER 4.000 I.P. 1440 PSI 32 TO 212° H2S	1		$ -
B078173	DISPLACER 300 LG=14.316L	0		$ -
[illegible]	PRESSURE CONTROL VALVE 3 300RF 720 PSI -20 TO 200° H2S	1		$ -
M806124	PRES.REGUL.67CFR MAXI INLET 250PSI OUT 5 A 35PSI	1		$ -
M873637	CONTROL VALVE 3ANSI300RF H2S STD TRIM	1		$ -
M873638	WIZARD II 4150K- 1000PSI WP OUTLET SIGNAL 6 - 30PSI	1		$ -
P778175	4 BALON CHECK VALVE	1		$ -
P778946	REPAIR KIT FOR CHECK VALVE 4' BALON	1		$ -
TOTAL				$ -

WT Spare Parts.xls

Part No.	Decription	Qty	UN. VALUE	TOT. VALUE
M812360	THERMOMETER DN100 1/2NPT 0-160 DEG.C/30-320 DEG.F SST	1		$ -
G820840	STUD BOLT M 16 X 90 A193 B7 CDM NUT A194 2H CDM	4		$ -
G822936	PRESS GAUGE 0-25BAR OD100 1/2NPT SST.	1		$ -
P783898	MULTIPORT GAUGE VALVE 1/2NPT MALE/FEMALE 10K H2S	1		$ -
G820742	MAMELON M .3/4 NPT X M .1/2 NPTA105 3000#BS	1		$ -
G823304	SCREW,H M10 - 30 A2/70 - NF E25-114	8		$ -
G826268	SCREW,H M14 - 25 A2/70 - NF E25-114	8		$ -
G829747	MANILLE LYRE BOULONNEE CALIBRE 1 1/2 17000 DAN	4		$ -
G820229	NUT H M10 ,A2/70, NF E25-401	8		$ -
G825091	WASHER W 10 , A4, NF E25-515	8		$ -
[illegible]	[illegible]	2		$ -
[illegible]	[illegible]	1		$ -
B078687	GASKET SET FOR ED VALVE 2.	1		$ -
B078688	PACKING SET FOR ED VALVE 2.	2		$ -
G828948	GROOVE PIN , SST	1		$ -
[illegible]	[illegible]	1		$ -
[illegible]	[illegible]	1		$ -
100177536	REPAIR KIT FOR BALL VALVE 2 IN. -50 TO 350 DEG. F	1		$ -
[illegible]	[illegible]	1		$ -
G822222	U.BOLT DIA.10 MM PIPE 2. STL ZC	1		$ -
G821141	U.BOLT DIA.12 MM PIPE 3. STL ZC	1		$ -
[illegible]	[illegible]	1		$ -
[illegible]	[illegible]	1		$ -
G822168	JOINT TYPE BX 154 API H2S OCTOGONALSST 316	16		$ -
G823699	PRESSURE GAUGE 100MM.1/2NPT 10000PSI 630B	2		$ -
G827778	TIG.FIL. 1. X 7. 1/4 A320 L7 CDMECROUS A194 GR7CDM	32		$ -
M812360	THERMOMETER DN100 1/2NPT 0-160 DEG.C/30-320 DEG.F SST	2		$ -
M817788	PLUG M .1/2 NPT H2S-10000PSI	2		$ -
P576953	THERMO WELL , M .1/2 NPT X F .1/2 NPT -H2S-10000PSI	3		$ -
P783898	MULTIPORT GAUGE VALVE 1/2NPT MALE/FEMALE 10K H2S	2		$ -
M830170	ADJUSTABLE CHOKE 3-1/16 10K -20/250F H2S	1		$ -
100178949	STEM FOR 3 IN. ADJUSTABLE CHOKE WITH 2 IN. SEAT, WC-COATED	1		$ -
G823693	GREASE NEVER-SEEZ REGULAR GRADE(1KG)	0		$ -
P778195	GATE VALVE 3-1/16 10K MAGNUM MANUAL F.E. HIGH TEMP	0		$ -
100305939	STEM FOR 3-1/16 10 KPSI MANUAL GATE VALVE NACE 2003 COMPLI	1		$ -
P486867	SEAL ASSY 3-1/16 10K HIGH TEMP	1		$ -
TOTAL				$ -

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WT Spare Parts.xls

Schlumberger	Oil Manifold / MFD-BCA			
Optional Spares				
Part No.	**Description**	**Qty**	**UN. VALUE**	**TOT. VALUE**
TOTAL				$ -
M&S Spares				
Part No.	**Description**	**Qty**	**UN. VALUE**	**TOT. VALUE**
[illegible]	[illegible]	1		$ -
P778044	REPAIR KIT FOR BALL VALVE 3 IN. 32 TO 212 DEG. F	1		$ -
TOTAL				$ -

Schlumberger — **3 1-16" WOM**

Client	Well	Field	Rig	Date	Job Reference

Container Number: WTCN xxx	Status: ☐ Ready ☐ Pending

3 1-16" 15K WOM Ready Box								
Item	Description	SUB Part Number	Local Purchase	Qty Issued	Qty Inspd	Out	In	Comments
1	Seal	8977169	PN-3459	4	2			
2	Thrust Bearing	8977170	2546	2	2			
3	Packing Assembly	8977185	SP-709	2	1			
4	Grommet Gasket	8977172	3459	6	2			
5	Gate (VR)	8977174	WM-1016-75	2	1			
6	Seal	8977175	PT-2459	8	4			
7	Back Up Ring	8977176	BS-3005	4	2			
8	Seal	8977001	PT-2570	4	2			
9	Seal	8977178	PT-3459	4	2			
10	Back Up Ring	8977179	BT-3010	4	2			
11	Seal	8977003	PT-2148	2	1			
12	Seal	8977181	PT-2345	2	1			
13	3" 15K Magnum Seal Assembly (VR)	8977182	8	4	2			
14	Grease Fitting	8977005	2145-1	2	1			
15	Grease Fitting	8977007	WM 703	2	1			
16	Test Screw	8977005	AC-3250	2	1			
	[illegible]							
17	Packing Assembly	8977209	MBBSP-12	2	1			
18	Wear Ring	8977210	MBBSP-13	4	2			
19	Seal	8977220	PT-2239	2	1			
20	Seal	8977270	PN-3738	2	1			
21	Seal, Piston	8977280	NP-4459	2	1			
22	Seal	8977281	PN-2149	2	1			
23	Back Up Ring	8977282	PR-210F	2	1			
24	Wear Ring	8977283	MBBSP-27	2	1			
25	Stem	8977855	MBBSP-28	2	1			
26	Seal	8977285	PN-2569	2	1			
27	Wear Ring	8977286	MBBSP-38	2	1			
28	Seal	8977875	PN-0529	2	1			
29	Test Screw	8977805	AC-3250	2	1			
30	Seal	8977171	PN-2229	2	1			
31	Stem	8977173	WM-1016	2	1			
32	Seal	8977183	PN-3369	2	1			
	[illegible]							
33	Seal Ring for API Flanges	8977168	BX 154	8	4			
34	Bolts for API Flange (8 per flange) - 1" x 7 3/4"	8978832	1 - 8 UN	8	4			
35	Nuts for Bolts as above	8978832	1 - 8 UN	16	8			

Comments:

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Schlumberger **McEvoy Spares**

Client	Well	Field	Rig	Date	Job Reference

Container Number: WTCN xxx	Status: ☐ Ready ☐ Pending

McEvoy Spares Ready Box

Item	Description	SLB Part Number	Local Purchase P/N	Qty Issued	Qty Req'd	Out	In	Comments
1	Sealing compound (10 lbs drum)		988467		1			
2	Stem packing 3" (6X)		21395		3			
3	Stem packing 3-1/16" (10K)		G 835826		3			
4	Stem packing 2-9/16" (15K)		23778		3			
5	Stem packing 3" (6X)		21530		1			
6	Stem bearing 3-1/16" (10K)		16753		1			
7	Stem bearing 2-9/16" (15K)		16886		1			
8	Grease retainer O ring (5,10,15K)		20767		5			
9	Grease retainer O ring (5,10,15K)		21535		5			
10	Body filler nipple (5,10,15K)		20828		2			
11	Sealing compound nipple (5,10,15K)		22552		2			
12	Bonnet gasket (6X, 10K)		G 835804		3			
13	Bonnet gasket (15K)		22845		2			
14	Bleed off tool (6X, 10K, 15K)		1160661		2			
15	Check valve (6X, 10K, 15K)		20833		2			
16	Set screw for check valve (5,10,15K)		20742		1			
17	Crossover bonnet bleeder port x 1/2" NPT				2			
18	Gate 3" (6X)		68268		1			
19	Gate 3-1/16" (10K)		68768		1			
20	Seat 3-1/16" 10K (set of 2)		1010357		1			
21	Gate 3-1/16" 10K reverse acting		64191		1			
22	Seat 3-1/26" 10K reverse actuated		1010355		1			
23	Gate 2-9/16" 15K		38249		1			
24	Seat 2-9/16" 15K (set of 2)		38749		1			
25	Gate 2-9/16" 10K		38245		1			
26	Seat 2-9/16" 10K (set of 2)		38758		1			
27	Gate 2-9/16" 10K reverse acting		34403		1			
28	Seat 2-9/16" 10K reverse actuated		25691		1			
29	Valve stem (10K)		63769		1			
30	Seat and body accessories		64803		1			
31	O ring, 6-1/2" ACME (2B13-3M)		G 835843		10			
32	Snap ring		M 882772		2			
33	O ring, 6-1/2" Quick union (4227-51)		G 835386		10			
34	Anti-extrusion ring		M 882769		2			
35	O ring (4227-49)		12283		10			
36	Octagonal seal ring BX154API		G 832768		1			

Comments:

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Schlumberger — **ESD & Hi-Lo Pilot**

Client	Well	Field	Rig	Date	Job Reference

Container Number:	Status	
WTCN xxx	☐ Ready	☐ Pending

ESD & Hi-Lo Pilot Ready Box

Item	Description	SLB Part Number	Local Purchase P/N	Qty Issued	Qty Returned	Out	In	Comments
1	Hi-Pilots as per P&ID			4	4			Reelco
2	Lo-Pilots as per P&ID			2	2			Reelco
3	Hydraulic quick dump relief valve (SSV and Flowline)			2	2			Reelco
4	Pneumatic quick exhaust			10	10			Reelco
5	Equivalent fittings for above pilots			6	6			Reelco
6	Redress kit for Hi-Lo Pilots			4	4			Reelco
7	Confirm packing list against P&ID							Reelco
	ESD Fittings as appropriate to particular panel							

Comments:

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Schlumberger — **Separator**

Client	Well	Field	Rig	Date	Job Reference

Container Number: WTCN xxx	Status: ☐ Ready ☐ Pending

Separator Ready Box

Item	Description	SLB Part Number	Local Purchase P/N	Qty issued	Qty rtrned	Out	In	Comments
1	Shaft and rotor assy., stainless steel rotor	G 822 404						
2	Rotor cage, type 316 stainless steel		005844-070					
3	Shaft, rotor, 17-4PH, stainless steel	G 822 405						
4	Spiral pin, 125-0625 H-D-P	G 822 406						
5	Bearing sleeve type, graphitor III	G 822 407						
6	Washer, thrust	G 822 408						
7	Magnet assy., type 304 S.S sheathed	G 822 369						
8	Spiral pin, 062-0500 H-D-P		000451-025					
9	O-ring, diaphragm, (viton)	G 822 385						
10	O-ring, test. Side cover (viton)	G 822 409						
11	CF meter] O-ring, calibration plug (viton)	G 822 410						
12	O-ring, cover, (viton)	G 822 411						

Comments:

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Schlumberger — **Separator - Daniel**

Client	Well	Field	Rig	Date	Job Reference

Container Number:	Status	
WTCN xxx	☐ Ready	☐ running

Separator - Daniel Ready Box

Item	Description	SLB Part Number	Local Purchase P/N	Qty (new)	Qty (used)	Out	In	Comments
1	BEARING PLUG & STUFFING BOX GASKETS FOR DANIEL	GB22150						
2	BLEED VALVE (1BB) FOR DANIEL 4"-6"	GB23030						
3	CLAMPING BAR (12) FOR DANIEL 6"	GB22086						
4	CLAMPING BAR SCREW (11) FOR DANIEL 4"-6"	GB22085						
5	COMPLETE EQUALIZER VALVE (1) FOR DANIEL 4"-6"	GB22022						
6	DANIEL SENIOR ORIFICE NON H2S	GB22304						
7	GREASE GUN FOR DANIEL 4"-6"	GB21020						
8	GREASE SEAL DOUBLE BALL CHECK VALVE(2)FOR DANI	GB22110						
9	HEX NUTS (23) FOR DANIEL 6"	GB22116						
10	LOWER PLATE CARRIER,SHAFT AND PINIONS FOR DANI	GB22142						
11	NEEDLE FOR DANIEL 4"-6"	GB23059						
12	OPERATING WRENCH FOR DANIEL 4"-6"	GB23005						
13	ORIFICE PLATE SEALING RING RUBBER 6" FOR DANIEL	GB23040						
14	ORIFICE SEALING PLATE UNIT 6" -TEFLON FOR DANIEL	GB21038						
15	O'RING (BLEEDER VALVE) FOR DANIEL 4"-6"	GB23052						
16	PACKING WASHER (9K) FOR DANIEL 4"-6"	GB23031						
17	PLATE CARRIER (9 DIA) FOR DANIEL 6"	GB23039						
18	SEALING BAR GASKET (9 A) FOR DANIEL 6"	GB23041						
19	SLIDE VALVE INDICATOR PLATE FOR DANIEL 4"-6"	GB23012						
20	SLIDE VALVE INDICATOR POINTER FOR DANIEL 4"-6"	GB23058						
21	STUDS (30) FOR DANIEL 6"	GB22117						
22	STUFFING BOX CENTERING RING (25D) FOR DANIEL 6"	GB22111						
23	UPPER PLATE CARRIER,SHAFT AND PINIONS FOR DANIE	GB22154						
24	VALVE CARRIER (17) FOR DANIEL 6"	GB22103						
25	VALVE CARRIER GUIDES (16) FOR DANIEL 4"-6"	GB22088						
26	VALVE CARRIER STOP PINS FOR DANIEL 4"-6"	GB22104						
27	VALVE SEAT 6" (1D) FOR DANIEL 6"	GB22105						
28	VALVE SEAT AND TOP GASKET FOR DANIEL 6"	GB22106						
29	VALVE SEAT SCREW (2BB) FOR DANIEL 4"-6"	GB22107						
30	VALVE SPRINGS (1B) FOR DANIEL 4"-6"	GB22089						
31	VALVE STRIP (2) FOR DANIEL 6"	GB23034						

Comments:

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Schlumberger — **Oil & Gas Manifold**

Client	Well	Field	Rig	Date	Job Reference

Container Number:	Status
WTCN xxx	☐ Ready ☐ Pending

Oil & Gas Manifold Ready Box

Item	Description	SLB Part Number	Local Purchase P/N	Qty Issued	Qty Used	Out	In	Comments
1	2" Balon 680 redress kit	P778943		4	2			
2	3" Balon 680 redress kit	P778944		4	2			
3	2" 680 gasket		FL3680-2	4	2			
4	3" 680 gasket		FL3680-3	4	2			
5	2" Balon valve body	P585839	3F-FE3N-RF	1	1			Base to hold
6	3" Balon valve body	P585838		1	1			Base to hold
7	2" ball		P3884-SS	2	1			
8	3" ball		P3839-SS	2	1			
9	4" ball							

Comments:

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Schlumberger — **Surge Tank**

Client	Well	Field	Rig	Date	Job Reference

Container Number:	Status
WTCN xxx	☐ Ready ☐ Pending

Surge Tank Ready Box

Item	Description	SLB Part Number	Local Purchase P/N	Qty (max)	Qty (min)	Out	In	Comments
1	Magnetic float				2			
2	Clear Plastic tube, rated 150psi 12 meters long, 1/2"				5m			
	Connected to tank with 1/2" swagelock or similar							
	Main Components							
3	3" series 30 Butterfly valve	BEL002		2	1			
4	3" Butterfly valve	MB71952	ZF30003	2	1			
5	Butterfly valve handle	N/A	ZF30004	1	1			
6	3" 150 gasket		FL150-3	2	1			
7	3" 300 gasket		FL300-3	2	1			
8	16" 150 gasket			1	1			

Comments:

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Schlumberger **EVERGREEN**

Client	Well	Field	Rig	Date	Job Reference

Container Number: WTCN xxx Status: ☐ Ready ☐ Pending

MMH (Evergreen) Ready Box

Item	Description	SLB Part Number	Local Purchase P/N	Qty (max)	Qty (min)	Out	In	Comments
1	Oil Channel Pipe (Steel)	P783377		6	6			
2	Oil Nozzle - Standard 10mm	P783371		6	6			
3	Oil Nozzle O-Ring	80123		24	24			
4	Belleville Washer	P78		12	12			
5	Jet Nut	P783210		6	6			
6	MMH-A Seal Kit including:	P783507		2	2			
	Jet Nut Ext. O-Ring, SZ 2-142, VITON 90	80						
	Jet Nut Int. O-Ring, SZ 2-132, VITON 90	80						
	O-Ring, SZ 2-252, VITON 90	80						
	Shuttle Plug O-Ring, SZ 2-012, VITON 90	80						
	Shuttle Piston O-Ring, SZ 2-030, VITON 90	80						
	O-Ring, SZ 2-264, 550"ID x 210"W VITON 90	80						
	[redacted]							
7	Y Nozzle Standard 4 x 10mm hole x 16mm exit	P		6	6			
8	HFR Kit Y Nozzle 6 x 10.5mm hole x 24.5mm exit c/w 13mm Oil Nozzle - Not interchangeable	P785123						
	HFR Nozzle Only	P785123		2	2			Part No. is for Kit
9	LR Kit Y Nozzle 4 x 6.5mm hole x 13mm exit Includes 6mm Oil Nozzle	P785122						
	LR Nozzle Only	P785		2	2			Part No. is for Kit
10	6mm Nozzles (for standard Y nozzle)	P785		6	6			Only if required
11	8mm Nozzles (for standard Y nozzle)	P783		6	6			Only if required
12	Water Nozzle	P783		2	2			
	[redacted]							
13	M20 x 65mm Set Screw		Local	2	2			
14	Set Screws Plain Flange	P		4	4			
15	M20 Nuts		Local	4	4			
16	Plain Flange Centraliser Bushings	P783		4	4			
17	Shuttle Plug	P		1	1			
18	Oil Line Swivel Seal Kit	80		1	1			
	[redacted]							
19	SWFI Ignition Box	80		4	4			
20	SWFI Ignition Box	80		4	4			
21	SWFI Ignition Box	80		4	4			
	[redacted]							
22	Centering Tool for Oil Tubes	P		1	1			
23	Caliper for Nozzles	P		1	1			
24	Shuttle Extraction Tool		Local	1	1			locally Made

Comments:

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Schlumberger — **Instrumentation Manifolds**

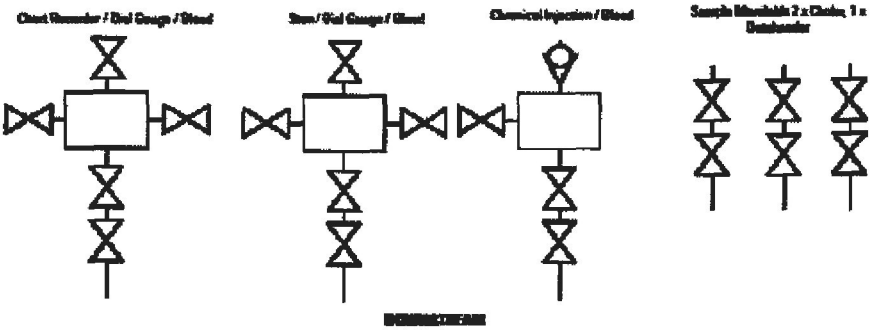
Client	Well	Field	Rig	Date	Job Reference

Container Number: WTCN xxx ☐ Ready ☐ Pending

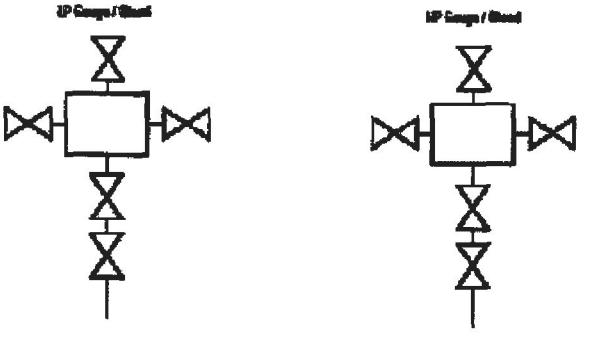
Instrumentation Manifolds Ready Box

Item	Description	SLB Part Number	Local Purchase PN	Qty (each)	Qty (sets)	Out	In	Comments
1	Fedpro chart recorder, dbl gauge, bleed				1			
2	Dead weight tester, spare port, bleed				1			
3	Slam sensor, dbl gauge, bleed				1			
4	Chemical injection point (ex Check Valve), bleed				1			
5	LP Gauge, spare port, bleed				1			
6	HP Gauge, spare port, bleed				1			
7	Sample point				3			
8	4MNST Poppet hose c/w 1/4" BSP connections				4			
9	3/16-60 21/8" ID Spatter Hoses w/1in.4.MC				4			

SPECIMEN



CONNECTIONS



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Schlumberger — **HP Fittings**

Client	Well	Field	Rig	Date	Job Reference

Container Number: WTCN xxx	Status: ☐ Ready ☐ Pending

HP Fittings Ready Box

Item	Description	SLB Part Number	Local Purchase P/N	Qty Used	Qty Held	Out	In	Comments
	WP&T Fittings							
1	1/4" NPTM 10 k plug				6			
2	1/4" NPTM x 1/4" NPTM nipple				6			
3	1/4" NPTF x 1/4" NPTF coupling				6			
4	1/2" NPTM 10 k plug				6			
5	1/2" NPTM x 1/2" NPTM nipple				6			
6	1/2" NPTF x 1/2" NPTF coupling				6			
7	1/2" NPTM x 1/4" NPTF bushing				6			
8	1/2" NPTM x 1/4" NPTM				6			
9	1/2" NPTF x 1/4" NPTF coupling				6			
10	1/4" NPTF tee				4			
11	1/4" NPTF cross				2			
12	1/2" NPTF tee				2			
13	1/2" NPTF cross				2			
14	1/4" NPTM x 1/4" BSPM				5			
15	1/4" NPTM x No. 4 JIC M				5			
16	1/2" NPTM x 1/4" BSPM				4			
17	1/4" 10 k needle valve				6			
18	1/2" 10 k needle valve				6			
19	No. 4 JIC plug				6			
20	No. 4 JIC cap				6			
21	No. 4 JIC male / male nipple				4			
22	No. 4 JIC male x 1/4" NPTF				2			

Comments:

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Schlumberger — **LP Fittings**

Client	Well	Field	Rig	Date	Job Reference

Container Number: WTCN xxx	Status ☐ Ready ☐ Pending

LP Fittings Ready Box

Item	Description	SLB Part Number	Local Purchase P/N	Qty Req'd	Qty Sent	Out	In	Comments
	LP Fittings							
1	1/2" MPTM x 1/4" MPTF bushing		1/2x1/4PTR-S		4			
2	1/2" MPTF x 1/4" MPTF coupling		1/2x1/4SC-S		5			
3	1/4" MPTM x 1/4" MPTM nipple		1/4-FF-S		6			
4	1/2" MPTM x 1/2" MPTM nipple		1/2-FF-S		6			
5	1/4" MPTF x 1/4" MPTF coupling		1/4-SC-S		6			
6	1/2" MPTF x 1/2" MPTF coupling		1/2-SC-S		6			
7	1/4" MPTF x 1/4" MPTF x 1/4" MPTF tee		1/4-SSSD-S		3			
8	1/2" MPTF x 1/2" MPTF x 1/2" MPTF tee		1/2-SSSD-S		3			
9	1/4" MPTF cross		1/4-SSSSD-S		2			
10	1/2" MPTF cross		1/2-SSSSD-S		2			
11	1/4" MPTF x 1/4" MPTF elbow		1/4-DD-S		3			
12	1/2" MPTF x 1/2" MPTF elbow		1/2-DD-S		3			
13	3/8" MPT M x 1/4" MPT F Bushing		3/8x1/4PTR-S		4			
14	3/8" MPT M x 3/8" MPT M Nipple		3/8-FF-S		4			
15	1/4" m x f ball valve, GK		HPBBNS-1M		5			
16	1/2" m x f ball valve, GK		FHPTSNS-1M		5			
17	1/4" MPT F x F Brass LP ball valve (for low pressures)		6651CPBBPTSNS		6			
18	1/2" MPT F x F Brass LP ball valve (for low pressures)		6651CPBBPTSNS		6			

Comments:

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Schlumberger — **Gasket Seals & Gauges**

Client	Well	Field	Rig	Date	Job Reference

Container Number: WTCN xxx Status: ☐ Ready ☐ Pending

Gasket Seals & Gauges Ready Box

Item	Description	SLB Part Number	Local Purchase P/N	Qty (max)	Qty Using	Out	In	Comments
	Pressure Gaskets							
1	BX154 ring gasket		FLEXT154		2			
2	BX155 ring gasket		FLEX155		2			
3	R35 ring gasket		FLR35		2			
4	ASA 150 3/4" gasket		FL 150-3/4		4			
5	ASA 150 2" gasket		FL150-2		4			
6	ASA 150 3" gasket		FL150-3		2			
7	ASA 150 4" gasket		FL150-4		2			
8	ASA 150 6" gasket		FL150-6		6			
9	ASA 600 1/2" gasket		FL2A600-1/2		2			
10	ASA 600 3/4" gasket		FL2A600-3/4		4			
11	ASA 600 1" gasket		FL2A600-1		2			
12	ASA 600 2" gasket		FL2A600-2		6			
13	ASA 600 3" gasket		FL2A600-3		6			
14	ASA 600 4" gasket		FL2A600-4		2			
15	ASA 600 6" gasket		FL2A600-6		2			
16	ASA 1500 3" gasket		FL1500-3		2			
17	ASA 150 16" gasket (VIT Manifolds)				3			
18	ASA 600 16" gasket (Choke Separator Manifolds)				1			
19	R24 ring gasket							
20	BX161 ring gasket							
21	ASA 150 8" gasket							
22	ASA 600 8" gasket							
23	R145 ring gasket							
24	Various paper gaskets							
	Physically verify manifold flange specs prior to load-out							
	Instrument Connections							
25	1-9/16 (+3/8)		KV		1			
26	9-16 PSIG		GA6		2			
27	0-100 PSIG		GD6		2			
28	0-300 PSIG		GG6		2			
29	0-600 PSIG		GJ6		2			
30	0-1000 PSIG		GK6		2			
31	0-1500 PSIG		GL6		2			
32	0-3000 PSIG		GM6		2			
33	0-5000 PSIG		GQ6		2			
34	0-10000 PSIG		GP6		2			

Comments:

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Schlumberger — **HYDROMETER**

Client	Well	Field	Rig	Date	Job Reference

Container Number: WTCN xxx	Status: ☐ Ready ☐ Pending

Hydrometers Ready Box

Item	Description	SLB Part Number	Local Purchase	Qty Issued	Qty Initial	Out	In	Comments
1	Hydrometer 0.950-0.990 SG		GH0990	1	1			
2	Hydrometer 0.990-1.030 SG		GH1030	1	1			
3	Hydrometer 0.700-0.750 SG			1	1			
4	Hydrometer 0.750-0.800 SG			1	1			
5	Hydrometer 0.800-0.850 SG			1	1			
6	Hydrometer 0.850-0.900 SG			1	1			
7	Hydrometer 0.900-0.950 SG		6S0950	1	1			
8	Hydrometer 0.950-1.000 SG		GH1215	1	1			
9	Hydrometer 1.000-1.050 SG			1	1			
10	Hydrometer 1.050-1.100 SG		GH1335	1	1			
11	Hydrometer 1.100-1.150 SG			1	1			
12	Hydrometer 1.150-1.200 SG		6S01200	1	1			
13	Red Spirit Thermometer -10-110°C (To job specification)		ST4055	1	1			

Comments:

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Schlumberger **Barton Recorder**

Client	Well	Field	Rig	Date	Job Reference

Container Number: WTCN xxx	Status: ☐ Ready ☐ Pending

Barton Ready Box

Item	Description	SLB Part Number	Local Purchase P/N	Qty Used	Qty Min	Out	In	Comments
1	Red Ink	G 022444			1			
2	Blue Ink	G 022445			1			
3	Green Ink	G 022446			1			
4	Static pen	G 022447			1			
5	Differential pen	G 022448			1			
6	Temp. pen	G 022449			1			
7	Aux. fountain pen	G 022452			1			
8	Turret, Maxwell chart drive	G 022454			1			
9	Door gasket	G 022455			1			
10	Chart hub	G 022457			1			
11	Hex key	G 022458			1			
12	Element, static pressure 1500 psig	G 022462			1			
13	Pen cleaning valve	G 022466			1			
14	Gasket	G 022472			1			
15	Differential spring 100"	G 022474			1			
16	Differential spring 200"	G 022475			1			
17	Differential spring 400"	G 022477			1			
18	Chart, box	G 022502			1			
19	Door glass	G 022504			1			

Comments:

Prepared by:	Reviewed by:	Page 1 of 1	WTS-SWT-SOP-01 Rev-1.0

BRNH-A EVERGREEN SPARE PARTS

SPARE PARTS

BOM PN	DESCRIPTION	ITEM	QTY	UOM	REF PN
P495018	PISTON VALVE	0	1	EA	P786893
P778996	SPRING WASHER	0	24	EA	P786893
P783363	FORE DEFLECTOR	0	1	EA	P786893
P783364	JET BODY	0	12	EA	P786893
P783371	NOZZLE DIAM 10 MM	0	12	EA	P786893
P783377	OIL CHANNEL	0	12	EA	P786893
P783383	DEFLECTOR TUBE	0	12	EA	P786893
P786697	BRNH-A SPARE SEAL LIST *Including:*	0	1	EA	P786893
B017205	*O-RING,SZ 2-142 2.382 ID X.103W VITON 95D H239846,400214*	*0*	*20*	*EA*	*P786697*
B017703	*O-RING, SZ 2-123, VITON, 95D*	*0*	*10*	*EA*	*P786697*
B019341	*O-RING,SZ 2-341, VITON, 95D*	*0*	*10*	*EA*	*P786697*
B024114	*O-RING, SZ 2-012, VITON, 75D*	*0*	*10*	*EA*	*P786697*
B024747	*O-RING,SZ 2-336 2.850 ID X.210 W VITON 75D*	*0*	*10*	*EA*	*P786697*
B076862	*O-RING,SZ 2-358 5.350 ID X.210 W VITON 95D*	*0*	*10*	*EA*	*P786697*
P793210	JET NUT M64	0	12	EA	P786893

ADDITIONALS

BOM PN	DESCRIPTION	ITEM	QTY	UOM	REF PN
P794307	STATIC MIXER	0	1	EA	P794307
P788068	CALIPER FOR NOZZELS	0	1	EA	P788068
(P793209 and P793208).	PRESSURE TEST PLUGS	0	1	EA	(P793209 and P793208).
P784509	SPECIAL ASSEMBLY TOOL	0	1	EA	P784509
P786973	TRANSPORTATION SUPPORT	0	1	EA	P785100
B078622	TOOL BOX 670X350X350 EMPTY	0	1	EA	P786973
P786101	LIFTING FRAME	0	1	EA	P786973
P786718	HEAD SUPPORT	0	1	EA	P786973
P789950	RUST TRAP PIPE	0	1	EA	P785100
P789700	OIL FILTER	0	1	EA	P785100
P790774	NOZZLE, DIA 8 MM	0	1	EA	P785100
P493892	JET NOZZLE REDRESSING TOOL SET				
P785314	SET OF TOOL FOR EVERGREEN *Including:*				
P784509	*SPECIAL TOOL FOR CENTERING OIL PIPE*		*1*		
P784558	*PLUG 12 JETS*		12		
P785897	*OIL PLUG NOZZLE*		12		
P788068	*UNIVERSAL CALIPER*		*1*		
B017205	*O-RING,SZ 2-142 2.382 ID X.103W VITON 95D H239846,400214*		*20*		
B017677	*O-RING, SZ 2-120, VITON, 95D*		*20*		
B076148	*O-RING,SZ 2-113 .549 ID X.103 W VITON 75D*		20		
P493826	SPREADER ASSEMBLY CENTERING TOOL				

MODIFICATION RECAPS

PN	DESCRIPTION
P790550	MR#1 KIT FOR BRNH-A
P500038	MR#10 KIT FOR BRNH-A
P500043	MR#11 KIT FOR BRNH-A
100183988	MR#12 KIT FOR BRNH-A
P790551	MR#2 KIT FOR BRNH-A
P790552	MR#3 KIT FOR BRNH-A
P790553	MR#4 KIT FOR BRNH-A
P790851	MR#5 KIT FOR BRNH-A
P791037	MR#6 KIT FOR BRNH-A
P790376	MR#7 KIT FOR BRNH-A
P790841	MR#8 KIT FOR BRNH-A
P500017	MR#9 KIT FOR BRNH-A

NOZZLE SELECTION

Y-nozzle	Part number	# outlet x Ø air nozzles	Maximum Air flow rate (choke 130 psi	Maximum Oil flow rate (bopd) without sand	Maximum Oil flow rate (bopd) with sand	Maximum Oil flow rate (bopd)
Low Flow	P786888	Ø13 outlet 4 x Ø8.5 air	2500	650	1300	4200
Standard	P783364	Ø19 outlet 4 x Ø10 air	6000	1500	3000	10000
High Flow	P785023	Ø24.5 outlet 6 x Ø10.5 air	10000	2500	5000	16500

It also exist a multi rate kit BMRK-A (P491057) that allow flowrates from 250 to 15000 BOPD (see BRHE-AC Maintenance Manual)

Tool Box S/N: _____ Date: _____

Sling S/N: _____ Sling Date: _____

Pad Eye Tag Date: _____ Name: _____

CANAL ENERGY BOILER TOOL BOX			
	NEED	ON HAND	ORDER TO RESTOCK
2in fig. 200 hammer union	1		
Absorbent pads	1		
Allen wrench set (small)	1		
Boiler chemical 5 gal pail	1		
Boiler computer	1		
Boiler fuses 10 amp	10		
Boiler fuses 30 amp	3		
Boiler fuses 60 amp	3		
Boiler gauge 300# (large)	1		
Boiler gauge 60 lb.	1		
Bushings – 2 x 1.5 --- 1.5 x 1.25 --- 1 x .5	3		
2 x 1.25 --- 1.25 x 1 --- 1 x .75	3		
Caution tape (roll)	1 Roll		
Compressor oil	1		
Crescent wrench	2		
Crows foot pins	4		
Diesel element / fuel filter 30 microns	1 / 3		
Diesel tank fitting w/ ball valve	1		
Diesel tank HAZMAT tags	10		
Electrical grounding strap	2		
Electrical meter	1		
ESD Panel / pipe / clamps	1 / 1 / 2		
Fan belts A-42	1		
Fire extinguisher	1		
First Aid kit	1		
Flashlight & extra batteries	1 – 4		
Fuel hose tubing and connectors	2		
Fuel tank coupling (return)	1		
Gloves	4		
H_2O Hose 100 ft. / air hose	1		
Hand cleaner	1		
Heater elements 1.88	2		
Heater elements 11.5	2		
Industrial TKX oil / spray bottle	1 / 1		
Jumper wire	1		
Light bulbs	4		

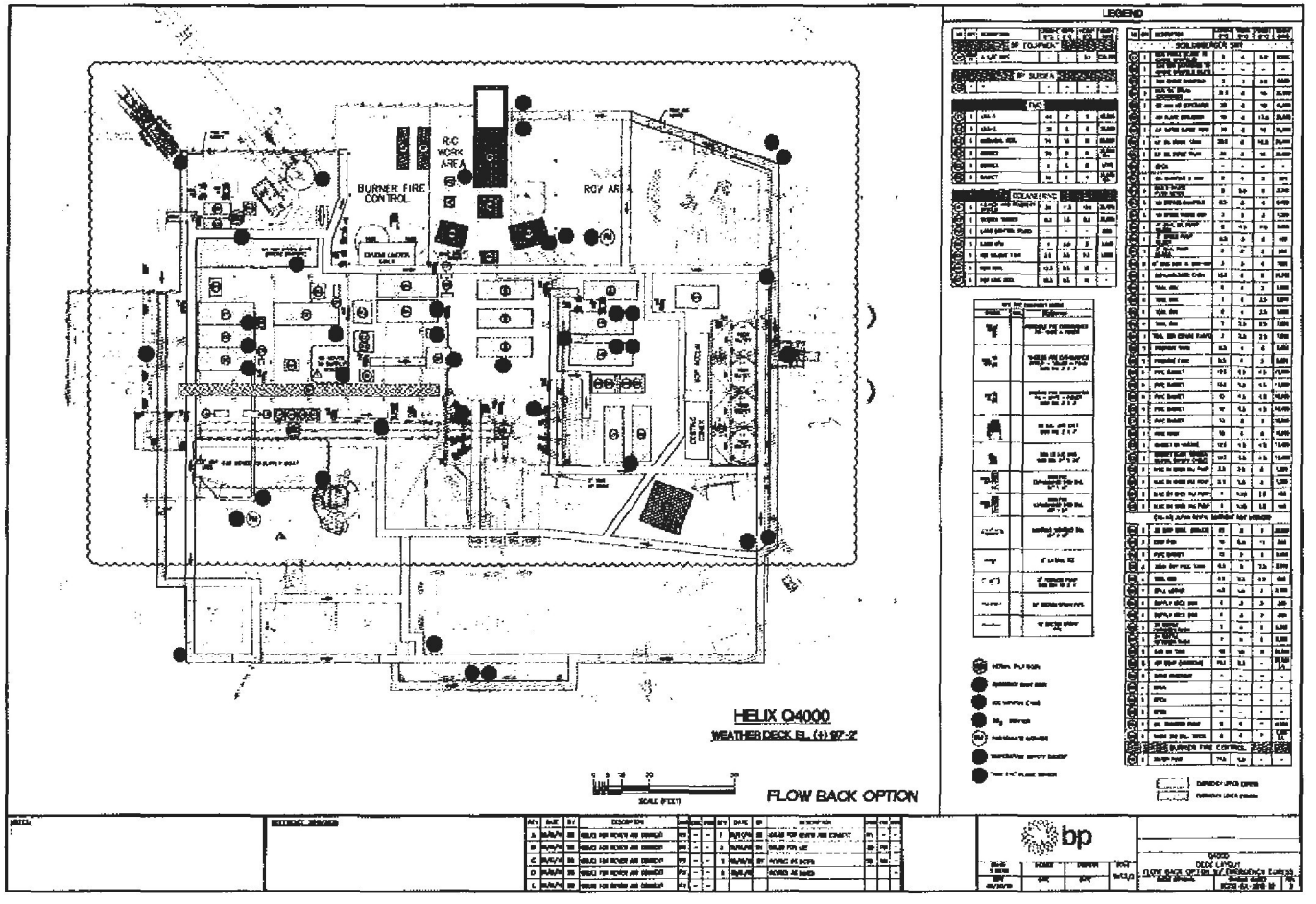
1

Tool Box S/N: _____ Date: _____

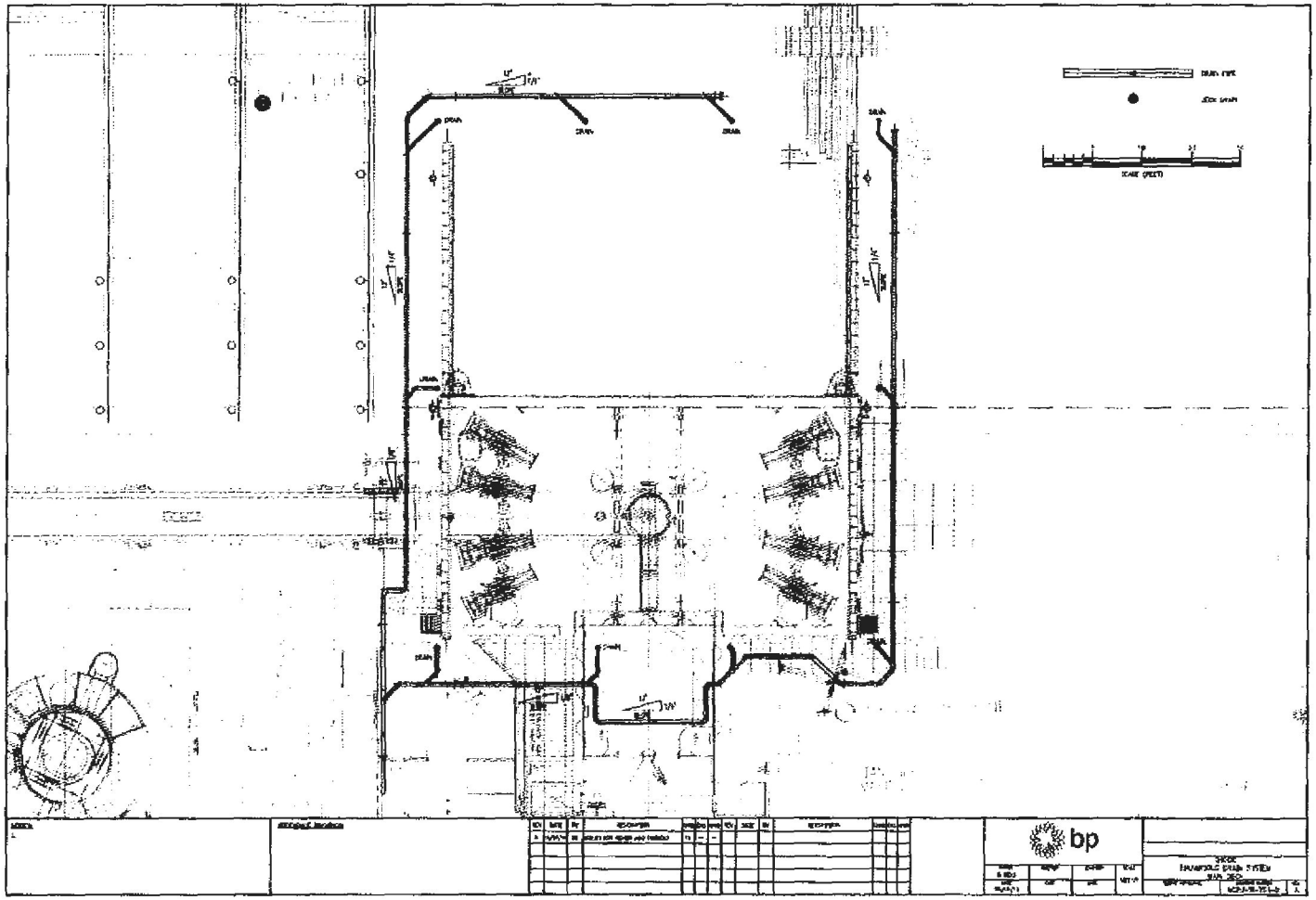
	NEED	ON HAND	ORDER TO RESTOCK
Manway gaskets (small)	2		
Manway gaskets (large)	1		
Misc. plugs – ¼" thru 2"			
Never seize (can)	1		
Pipe fittings NPT - 2in thru ¼			
Pipe wrench (small)	1		
Pipe wrench (medium)	1		
Propane Tank 5 gal.	1		
Rags	6		
Rope 50 ft.	1		
Safety harness	1		
Screwdriver set	1		
Site glass w/ fittings / guard	1 / 4 / 1		
Sledge hammer (small)	1		
Slicker suit	1		
Socket set	1		
Spare run bulbs	2		
Spare valves – ¾ , 1, 1¼ , 2	4		
Supply tank temp. gauge	1		
Supply water connector	1		
Tape (electrical / teflon / duct)	1 / 1 / 1		
Tie raps (50)	1 Bag		
Tool chest	1		
Vacuum Relief Valve	1		
Water pump hose w/ clamps	1 / 2		
Wire brush	1		
Worm clamps (assorted)	10		
Wrench set	1		

NOTES: The Q4000 and the Enterprise have extra fuel solenoid valves and we have ordered extra photo eyes from cleaver brooks the boilers are also stocked with extra fuel Filters above is the list of normal parts included inside the tool boxes and critical parts have spares.

Attachment 4: Q4000 Well Test Equipment Deck Layout



Attachment 5: Q4000 UFD Drains



Attachment 6: Q4000 Pre-Test Start-Up Check List

Q4000 Pre-Startup Checklist for Operations

Reviewed By:	Name	Signature
Well Site Manager		
OIM / Rig Manager		
BP Test Supervisor		
SLB Test Supervisor		

Certificates and Manuals		Initial	Date
Equipment certification package valid and held on rig	☐		
Vessel name plates checked against P&ID's	☐		
Relief valve certification valid and held on rig: including reset and retests if available	☐		
Well test equipment manuals held on rig	☐		
SLB Well Testing Operations manual held on rig	☐		
SWT equipment electrically inspected and in conformance with rig requirements including grounding	☐		
Rig flowlines certification package valid and held on rig (incl. boom piping if rig booms). Rig flowlines are of welded / flanged construction (not threaded)	☐		
Rig gas alarms test certs: including entire fire system tests (pumps. monitoring. etc.)	☐		
Boiler maintenance manual held on rig (including tool box. spare and critical parts list)	☐		
Calibration documentation (gas detectors. BPV's. etc.)	☐		
Documentation that HAZOP / HAZID items have been closed	☐		
Red line set of P&ID's in controlled location	☐		
Well test equipment and flow line pressure / leak test certs	☐		
Verifications of safety protection system testing (PSH. PSL. LSH. LSL. PSV's)	☐		
Surface Test Equipment Installation		**Initial**	**Date**
Have rig flowlines been checked and confirmed to not contain any hydrocarbons	☐		
Are rig flowlines free from scale (have they been flexed and flushed)	☐		
Has well test installation been checked against approved P&ID and PFD	☐		
Has work site inspection been completed and actions closed out	☐		
Verify that access and escape routes clear and free of obstructions	☐		
Have personnel been briefed on maximum permitted working hours	☐		
Have all the NPT threads in the system been inspected prior to pressure testing	☐		
Are tapping points clear and situated at the top of piping to minimize potential for blocking	☐		